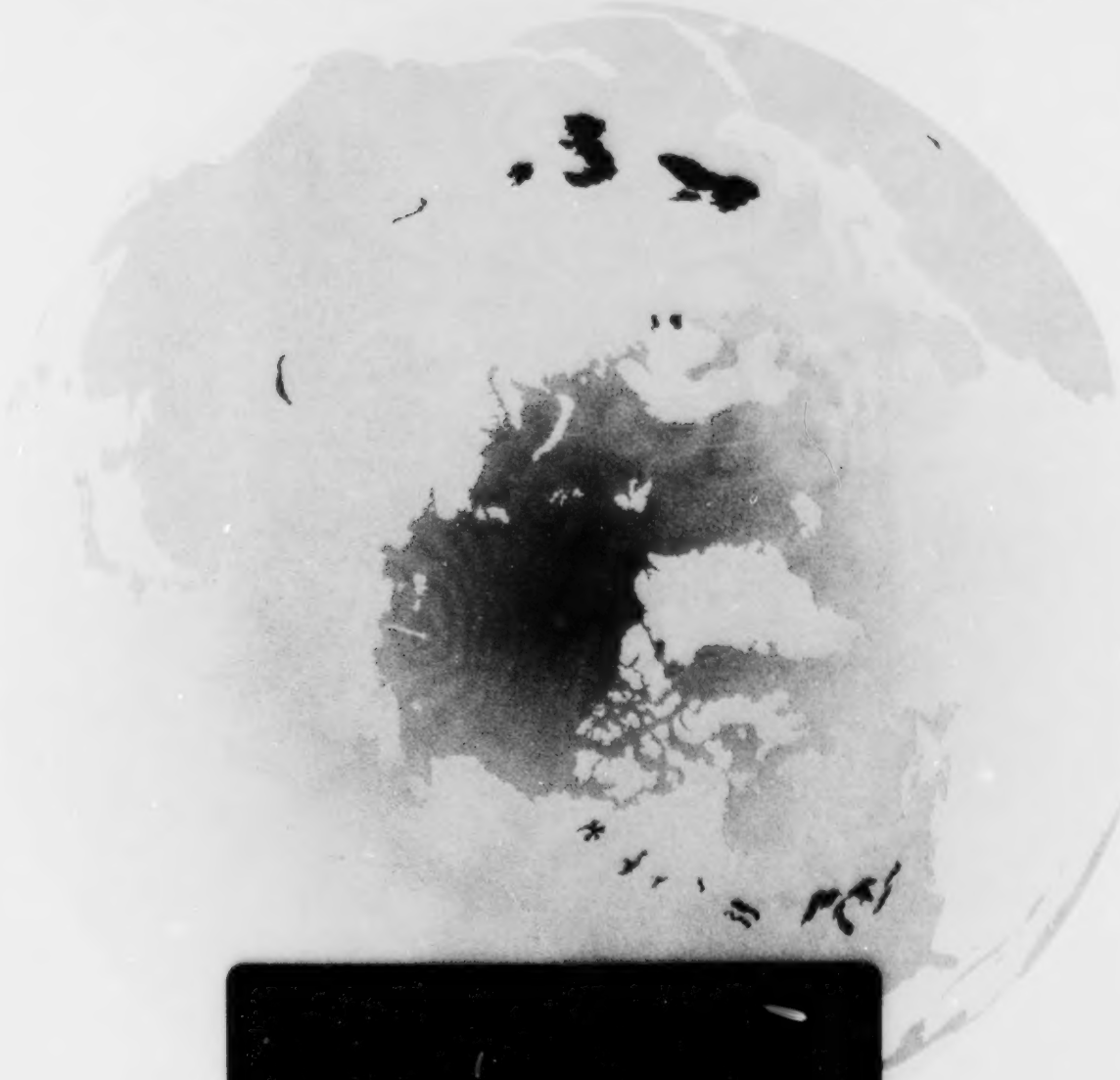
NORTHERN SCIENTIFIC TRAINING PROGRAM

PROGRAMME de FORMATION SCIENTIFIQUE dans le NORD



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Northern Scientific Training Program (NSTP)
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Programme de formation scientifique dans le Nord (PFSN)
Direction de la gestion stratégique et de l'analyse économique
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ANNOTATED BIBLIOGRAPHY/ BIBLIOGRAPHIE ANNOTÉE 1997 and / et 1998

May / Mai 2000

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FOREWORD

The annotated bibliography is produced on a bi-annual basis. This is the thirteenth annotated bibliography based on research which has been fully or partly funded by the Northern Scientific Training Program (NSTP). It is a combination of 1997-1998 and 1998-1999 research years.

Its aim is to provide a perspective on the range of research projects supported by the NSTP, and is designed to promote the exchange of information and collaboration among academics, northern experts and northern communities. Moreover, it demonstrates the significance of northern scholarship resulting from the Program.

The preparation of this bibliography has resulted from the collective efforts of several people. Accordingly, I would like to thank Mr. Robert Croskery and Ms. Julie Boucher-Savoie for their assistance and Ms. Rhonda Turner for her overall coordination of the project.

AVANT-PROPOS

La bibliographie annotée est produite tous les deux ans. Il s'agit de la treizième bibliographie annotée recueillant des travaux de recherche financée en totalité ou en partie par le Programme de formation Scientifique dans le Nord (PFSN). Elle porte sur les travaux réalisés en 1997-1998 et 1998-1999.

Nous la publions afin de montrer l'étendue des travaux subventionnés par le PFSN et de favoriser l'échange d'information et la collaboration entre les universitaires, les spécialistes des questions nordiques et les collectivités du Nord. Nous désirons mettre en évidence la somme des connaissances résultant du PFSN.

Cette bibliographie fut réalisée grâce aux efforts et à la collaboration de M. Robert Croskery et M^me^ Julie Boucher-Savoie, ainsi qu'à M^me^ Rhonda Turner, qui en a assuré la coordination. J'aimerais profiter de l'occasion pour leurs offrir mes sincères remerciements.

Sheilagh Murphy
Secretary / Secrétaire
Northern Scientific Training Program
Programme de formation scientifique dans le Nord
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INTRODUCTION

This annotated bibliography comprises the abstracts of theses, essays, reports, seminar and conference presentations, and other scientific papers based on projects supported by the NSTP. All the abstracts were submitted, published or presented in 1997 or 1998.

The information contained in this bibliography was compiled mainly from the NSTP research reports submitted by students for the 1997-1998 and 1998-1999 research years. All information was checked for accuracy through follow-ups with the participating universities.

The first two sections of the bibliography (1997 and 1998) are alphabetically organized by university and by author. The bibliographical references were completed using the following criteria: author, abstract[1], discipline and fieldwork location. The indices of the bibliography are divided into three: author, discipline and fieldwork location.

The NSTP Secretariat received submissions from 20 Canadian universities for the 1997-1998 research year, for a total of 134 bibliographical entries. During 1998-1999, abstracts were submitted by 19 universities, for a total of 95 bibliographical entries.

[1] This symbol "←/→" was used to condense those abstracts/descriptions which were of considerable length.

INTRODUCTION

Cette bibliographie analytique renferme les résumés de thèse, d'essais, de rapports, de présentations à des séminaires et à des conférences ainsi que d'articles scientifiques divers liés à des travaux entrepris dans le cadre du PFSN. Tous les résumés ont été soumis, publiés ou présentés en 1997 ou 1998.

L'information présentée est tirée surtout des rapports de recherche soumis par des étudiants en 1997-1998 et 1998-1999. Les données ont fait l'objet d'une recherche documentaire puis d'un suivi auprès des universités concernées pour en assurer l'exactitude.

Les deux premières sections de la bibliographie (1997 et 1998) sont présentées par ordre alphabétique selon l'université et l'auteur. Les références bibliographiques renferment les éléments suivants : auteur, résumé[1], discipline et lieu des travaux sur le terrain. Les index sont divisés en trois parties : auteur, discipline et lieu du travail sur le terrain.

En 1997-1998, le Secrétariat du PFSN a reçu des soumissions de 20 universités, qui ont donné lieu à 134 notices bibliographiques. En 1998-1999, il a reçu des résumés de 19, qui ont donné lieu à 95 notices bibliographiques.

[1] Nous avons parfois utilisé le symbole "←/→" pour abréger les textes qui étaient trop longs.

ANNOTATED BIBLIOGRAPHY BY UNIVERSITY 1997/
BIBLIOGRAPHIE ANNOTÉE PAR UNIVERSITÉ 1997

UNIVERSITY OF ALBERTA

97-001 ARENDT, A. (1997). Approaches to modelling the mass balance of High Arctic Glaciers. Poster Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
Degree-day and energy balance models have been used extensively to simulate the mass balance of Arctic glaciers, and to simulate the response of glacier mass balance to changes in climate with increased concentrations of greenhouse gases in the atmosphere. Given the difficulty/cost of obtaining data from remote Arctic locations, however, little information is available to properly test/parameterize mass balance models. As a result, parameterizations of surface albedo and superimposed ice accumulation (for energy balance models), and of positive degree-day factors (for degree-day models) have not been given adequate attention. This work examines the predictive capabilities of degree-day and energy balance models for simulating the mass balance of John Evans Glacier, and describes new approaches to simulating key components of the mass balance of high Arctic glaciers, based on field data from the summer of 1996. Physically-based surface albedo and superimposed ice formation routines are implemented in the energy balance model, and shown to provide improved predictions over previously-used empirical methods. For degree-day model simulations, a method of determining positive degree-day factor variations through the melt season is, developed. Based on a limited ablation stake network, the average specific mass balance of JEG from 1996 to 1997 was 150 mm WE. Energy balance simulations predicted 16 mm WE and degree-day simulations predicted 130 mm WE.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: John Evans Glacier, Ellesmere Island, Nunavut

97-002 BLAKE, D. (1997). Inuit Autobiography: Challenging the Stereotypes. Research Report, Faculty of Science, University of Alberta.

ABSTRACT/DESCRIPTION:
In 1996, I had interviewed Inuit in the Mackenzie Delta area and had asked about the popularity of books by Inuk author Alice French, "My Name is Masak (1976)" and "The Restless Nomad (1992)". My Ph.D. thesis deals in part with these autobiographies. I stayed at Mrs. French's house for two days in order to ask her opinions about Inuit autobiography and Inuit women's autobiography in particular. I also wished to gauge her reaction to academic criticism of her works and to inquire about the future of her writing. Her comments will be included in my thesis chapter on the life writings of Alice French and Minnie Aodla

Freeman; this chapter will stress the difficulties involved in generalizing about Inuit women's autobiography and in trying to categorize it.

DISCIPLINE: Linguistics

FIELDWORK LOCATION: Mackenzie Delta, N.W.T.

97-003 **BOND, J.D. (1997).** Late Cenozoic history of McQuestern Map Area, Yukon with applications to placer gold research. M.A. Thesis, Department of Geography, University of Alberta.

ABSTRACT/DESCRIPTION:
The late Cenozoic history of McQuestern map area is characterized by progressively less glaciations and deteriorating interglacial climates. The glaciations, from oldest to youngest, are the pre-Reid (a minimum of two early to mid Pleistocene glaciations), Reid (>200 ka), and McConnell (<29.6 ka BP). Pre-Reid interglacial reconstructions suggest a much warmer and more humid climate than today. The Koy-Yukon interglacial (200 ka) is considered to have a climate similar to a southern boreal forest and the first intact Diversion Creek paleosol, from this period, is documented in the McQuestern River valley. The Stewart neosol (Holocene) is widespread and poorly developed in comparison to past interglacial soils. The distribution of surficial deposits, related to multiple glaciations, physiography, and fluvial order contrasts, may govern the distribution of placer gold occurrences in the study area. Placer deposits occur anomalously in areas outside the pre-Reid limit on Klondike Plateau, and on Stewart Plateau. Further exploration in McQuestern map area should reassess the placer potential of Klondike Plateau, within the pre-Reid ice limits.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: McQuestern Map Area, Yukon

97-004 **CLARK, D.A. et al. (1997).** "Distribution, characteristics, and use of earth dens and related excavations by polar bears". Arctic - Journal of the Arctic Institute of North America, 50 (2):158-166.

ABSTRACT/DESCRIPTION:
Polar bears fasting on land along the western coast of Hudson Bay during the open water period, from late July through early November, excavate three different types of structures: pits, deep dens, and shallow dens. Pits were shallow excavations on the tops of banks or beach ridges, whereas both deep and shallow dens were dug into frozen peat banks. Pits were used as temporary resting places. The function of shallow dens is less clear, although some bears have been observed resting in them. Deep dens, with an entrance tunnel and enlarged

inner chamber, are similar in size and structure to maternity dens dug in snow by female polar bears elsewhere in their range. Deep and shallow dens are primarily occupied by lone females, most of which are pregnant, while pits are occupied by adult males and used more during summer than in autumn. Pregnant polar bears in western Hudson Bay give birth between mid-November and mid-December, by which time snowdrifts suitable for the construction of maternity dens have not yet formed in most years. Thus, because earth dens represent the only consistently suitable environment available at the time of parturition, we suggest most cubs in western Hudson Bay are born in them. Consequently, the availability of suitable habitat for the construction and use of earth dens is probably critical to the survival of the polar bear population in Western Hudson Bay.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Hudson Bay Lowlands, N.W.T.

97-005 ESDALE, J.A. (1997). Geoarchaeological analysis of the Dog Creek Site, northern Yukon. Research Report, Canadian Circumpolar Institute, University of Alberta.

ABSTRACT/DESCRIPTION:
Excavations in the Old Crow Basin during 1997 were part of a 3-year project on long-term human land use in the Porcupine River Basin. Field work was at Schaeffer Creek (MIVm-4), a late prehistoric to historic age fishing camp, and Dog Creek (NcVi-3), an early Holocene camp containing bone and lithic materials. Samples of modern frost features and cryoturbated surfaces were taken for micro morphology at Schaeffer Ck to be used in comparison with similar modern and ancient features at Dog Ck. Dog Ck has 2 ridges, called the River-ridge and the Mid-ridge divided by a swale in the bedrock. Excavations discovered that the sediment on the Mid-ridge is over 1m deep, with cultural material throughout. Several 1x1m units were excavated on both ridges. Trend and plunge data of artifacts in the Mid-ridge will determine if solifluction and freeze-thaw affected their position. Sediment samples were taken for grain-size analysis; oriented samples for micro morphology. The site was mapped and profiles drawn of the walls at the Mid-ridge. Bone and organic matter will be 14C dated. The base of a lanceolate point found at one unit suggests the deposits are early Holocene. Fieldwork will continue through 1998. The integration of cultural and sedimentological data will provide a geological and paleoarchaeological context for the artifacts at the site.

DISCIPLINE: Archaeology

FIELDWORK LOCATION: Old Crow, Yukon

97-006 GRANT, S.L. (1997). Geochemical, radiogenic tracer isotopic, and U-Pb geochronological

studies of Yukon terrace rocks. M.A. Thesis, Faculty of Science, University of Alberta.

ABSTRACT/DESCRIPTION:
This study presents geochemical and isotopic analyses of supra crustal and igneous rock from the Money Klippe in southeastern Yukon in order to constrain the tectonic evolution of the pericratonic Yukon Tanana terrace. Samples from the supra crustal Nisutlin assemblage indicate that while some Nisutlin assemblage rocks are similar to the North American miogeocline, juvenile material (uncommon in the miogeocline) also contributed to the Nisutlin provenance. These data support models indicating that the Nisutlin assemblage formed as a distal portion of the miogeocline. Some samples from the mafic Anvil assemblage have geochemical characteristics of calcalkalic basalt, which does not support the correlation of the Anvil assemblage to the ocean floor-dominated Slide Mountain terrace. Geochemistry indicates that the Simpson Range plutonic suite (SRPS) is the product of calcalkalic continental arc magmatism. U-Pb dating of zircons show that all SRPS rocks were formed between 344 and 360 Ma. Inherited zircon of broadly Proterozoic age, Nd model ages, initial Sr ratios, and Pb ratios in excess of those of the uniform reservoir all show that older crust has contributed significantly to the petrogenesis of SRPS, although to varying amounts, perhaps depending on the thickness of the intruded crust. These studies are compatible with a model which suggests that the Yukon Tanana terrace consists in part of a Devonian-Mississipian fringing arc built on the NA miogeocline.

DISCIPLINE: Geology

FIELDWORK LOCATION: Money Klippe, Yukon

97-007 HANKE, G.F. (1997). The search for early Devonian placoderm fishes in the Mackenzie Mountains, N.W.T. Research Report, Department of Life Sciences, University of Alberta.

ABSTRACT/DESCRIPTION:
Four new intact skulls of the placoderm Romundina and several isolated scale and thorax plate fragments were collected from the Lower Devonian sediments exposed at the MOTH site. Rock samples from the outcrop are currently being dissolved to recover bone fragments to supplement the faunal composition inferred from intact fossils. The sharks recovered in the 1996 collecting trip are potentially the most interesting group of fishes of all taxa collected. The shark fauna has proven to be much more diverse than indicated by specimens in the UA collections. Several additional specimens of known chondrichthian scales, and many more scales of unknown "species" were collected in 1996. Several unique chondrichthian scales and many isolated scales of taxa already known from "MOTH" have been recovered from the residues of acid preparation of rocks. One of the scales recovered resembles the 3S scales but has additional lateral flanges and an expanded base. Hopefully,

additional effort in the field will uncover articulated specimens of these fish. First indications are, based on the quality of the few specimens recovered, that these new fossils will greatly enhance our knowledge of early sharks. Most articulated shark specimens are now cleaned of surrounding rock and matrix and are permanently stored in the University of Alberta vertebrate palaeontology collection. Work will now focus on published formal descriptions of these early sharks.

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

97-008 HANKE, G.F. and WILSON, M.V.H. (1997). "Examination of shark-like scales from the Mackenzie Mountains, Northwest Territories". Ichthyolith Issues, special publication, 2(15) (Special Edition).

ABSTRACT/DESCRIPTION:
Shark-like scales were reported from the Mackenzie Mountains., following survey trips to the "MOTH" locality between 1963 and 1996. The largest scales (referred to here as type 1S scales) have no apparent base or pulp cavity. These scales resemble *Antarctilamna sp.* and *Caldolepis gunnelli* in overall proportion and have similar heavily-ornamented crowns. These ridges also resemble those of *Ohiolepis*, being short in the anterior 3rd of the scale, elongate posteriorly, and terminate in spines. Smaller scales have very fine parallel crown ridges and have a shallow base in the anterior 3rd of the scale. The ridges of 2S scales resemble those of *Elegestolepis* and *Apalolepis obruchevi*, and terminate at a finely serrated posterior edge. A third scale type is identified by pronounced lateral basal flanges and a single median crown ridge, similar to Turner and Murphy and *Moreyella*. Articulated 3S scale patches show gradation from narrowly ridged body scales to scales with broad tear-drop shaped crowns have associated straight, shallowly inserted spines, one scale patch has what is interpreted as a short pectoral spine, which suggests the potential for a mosaic of acanthothan and elasmobranch characters in early elasmobranch taxa. A fourth scale type is that of *Polymerolepis*. Two other scale patches were recovered from the MOTH site in 1996 that do not correspond to any taxa previously described in the MOTH fauna; these appear similar to *Cladolepis sp.*

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

97-009 HARPER, K.A. and KERSHAW, G.P. (1997). "Soil Characteristics of 48-year-old Barrow Pits and Vehicle Tracks in Shrub Tundra along Canol 1". Arctic and Alpine Research, 29(1):105-111

ABSTRACT/DESCRIPTION:
Soil development was investigated as part of an intensive study of long-term revegetation patterns of shrub tundra on anthropogenic disturbances within a 15-km section of the CANOL pipeline corridor, N.W.T. Soil temperature, pH, percent organic matter, moisture content, and particle size composition were determined for sites in vehicle tracks and borrow pits during the summer of 1993. Elevated temperature was the most substantial difference between soils in vehicle tracks and undisturbed sites. Warmer, drier, and less acidic soils in borrow pits contained less organic matter and were more coarse textured than undisturbed soils. Low levels of organic matter on borrow pits suggest slow soil development over nearly 5 decades of primary succession. Soils were well developed on CANOL vehicle tracks, where they were moister with higher organic matter content than undisturbed soils.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: CANOL Pipeline Corridor, N.W.T.

97-010 HARPER, K. (1997). Variation in forest structure and composition along edge-to-interior gradients in aspen forests. Research Report, Department of Biological Sciences, University of Alberta.

ABSTRACT/DESCRIPTION:
The study area includes aspen-dominated mixed wood boreal forest surrounding lakes with different buffer widths. Forest structure and composition data have been collected on several transects for pre- and post-harvest seasons. In 1997, additional transects of contiguous plots were set up for more intensive study on spatial pattern analysis of species at lakeshore edges. Results are available at this time only for lakeshore edges. Lakeshore forest edges were more structurally diverse with increased coarse woody material, more saplings and mid-canopy trees, and taller saplings than further into the forest. Data illustrate considerable heterogeneity within the interior forest, as well as at the lakeshore forest edge. One more field season remains in this study during which all transects at clear-cut edges will be re-sampled. Additional transects will be established in 1998 adjacent to clear-cuts. Detailed techniques for data analysis are being developed for examining the differences in edge effects from lakeshore and clear-cut edges, and predicting the combined effects in buffer strips. Determining methods for data analyses comprises a major portion of this research. New methods, currently being developed for measuring depth of edge influence for lakeshore forest edges, will be modified for clear-cut forest edges.

DISCIPLINE: Biology

FIELDWORK LOCATION: Northern Alberta

97-011 HARPER, K.A. and MACDONALS, S.E. (1997). "Variation in forest structure composition along gradients in the aspen-dominated mixed wood forest". American Journal of Botany, 84(6):81.

ABSTRACT/DESCRIPTION:
Riparian forests are becoming more important for wildlife as buffer zones around lakes become the principle unharvested areas within a harvested landscape in northern Alberta. Changes in forest structure and composition across the riparian forest ecotone were investigated to elucidate patterns along the lakeshore edge-to-interior gradient. Trees, coarse woody material, saplings, shrubs, and herbaceous plant species composition were sampled along 200m transects established perpendicular to lakeshore forest edges. Lakeshore forest edges were more structurally diverse with increased coarse woody material, more saplings and mid-canopy trees, and taller saplings than further into the forest. Individual herb and shrub species exhibited different patterns at the lakeshore edge: *Rosa acicularis*, *Viburnum edule*, *Linnaea borealis* and *Mitella nuda* increased along the edge-to-interior gradient, while *Amelanchier alnifolia*, *Petasites palmatus* and *Lathyrus ochroleucus* decreased. Edge effects appear to penetrate 50m into the forest. Data also illustrate considerable heterogeneity within the interior forest, as well as at the lakeshore forest edge. Structural and compositional features of the lakeshore forest edge may be important to wildlife. The variation in forest structure and composition due to edge effects in riparian forests is an important part of the overall heterogeneity in the boreal forest landscape.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Northern Alberta

97-012 HOWLAND, K.L. (1997). Migration patterns of freshwater and anadromous inconnu, in the Mackenzie River System. M.A. Thesis, Faculty of Science, University of Alberta.

ABSTRACT/DESCRIPTION:
Inconnu are migratory whitefish important to subsistence and commercial fisheries in the western Arctic. Although both freshwater and anadromous migratory forms are thought to exist in the Mackenzie River system, little detailed information has been available to substantiate this hypothesis. To determine their migratory patterns, within this river system, I synthesized the scattered historical information and conducted an intensive field study involving long-term seasonal gill-netting and radiotelemetry on two representative rivers, the Arctic Red River and the Slave River, N.W.T. The combined information from the historical survey and field study revealed substantial differences in the timing and extent of spawning migrations in these two rivers. Strontium analysis of otoliths confirmed the existence of the two migratory forms; inconnu from the Slave River remain in freshwater throughout their lives, whereas inconnu in the lower Mackenzie annually migrate between the sea and freshwater after spending one to six years in freshwater.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Arctic Red River, Fort Smith, Slave River, N.W.T.

97-013 HOWLAND, K.L. (1997). Variation in migratory patterns of freshwater and anadromous inconnu within the Mackenzie River System. Presentation, Canadian Conference for Fisheries Research, Ottawa, Ontario, January 2-4, 1997.

ABSTRACT/DESCRIPTION:
The inconnu is a highly migratory whitefish of considerable importance to subsistence and commercial fisheries in the western Arctic. Although both freshwater and anadromous migratory forms are thought to exist in the Mackenzie River system, little detailed information has been available to substantiate this hypothesis. To determine their migratory patterns within this river system, we conducted an intensive field study involving long-term seasonal gill-netting and radio-telemetry on inconnu from two representative rivers, the Arctic Red River and the Slave River. Our results indicate substantial differences in the timing and extent of inconnu spawning migrations in these two rivers. Strontium analysis of inconnu otoliths confirmed the existence of two migratory forms; inconnu from the Slave River remain in freshwater throughout their lives, whereas those from the Arctic Red River annually migrate between the sea and freshwater after spending one to three years in freshwater.

DISCIPLINE: Biology

FIELDWORK LOCATION: Arctic Red River, Fort Smith, Slave River, N.W.T.

97-014 LAMOUREUX, S. (1997). Distinguishing between climate, weather, and lake controls on varved sedimentation in High Arctic. Presentation, 27th Arctic Workshop, Ottawa, Ontario, February-March 1997.

ABSTRACT/DESCRIPTION:
Research is focussed on reconstructing past climatic conditions from varved sediments in Nicholay Lake and the development of a high resolution paleoclimatic record from the low-relief, unglaciated terrain typical of the central and western arctic islands. Analysis of the laminae reveals clear annual units, comprising a rhythmically laminated silty summer layer grading to a fine clay layer representing fall and winter deposition. A major goal of the research was to identify and remove non-climatic bias from the final paleoclimatic record. An array of sediment cores provides a spatial and temporal record of sedimentation variations during the past 500 years. Two primary non-climatic bias are observed in the accumulation record. Results also reveal that many of the years with high sedimentation rates share a similar accumulation pattern with low accumulation years, suggesting a substantial

increase in river-derived sediment. These events are sedimentologically distinct from rurbite deposits and may be the product of intense rainfall events generating high suspended sediment loads during the summer. If the hypotheses are correct, the area may contain a record of similar past events, and will provide the first indication of the long-term erosional capability and frequency of heavy rainfall in the high arctic.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Cornwallis Island, Nunavut

97-015 LAMOUREUX, S. (1997). Paleohydrological conditions in the central Canadian High Arctic during the past 500 years. Research Report, Faculty of Science, University of Alberta.

ABSTRACT/DESCRIPTION:

A network of 11 sediment cores were obtained from Nicholay Lake during 1995-96 to develop a record of sediment accumulation. All evidence suggests that Nicholay Lake contains annual sediment structures called varves, which permit reconstructionof streamflow conditions in detail for the past 500 years. Analyses show that catchment sediment yield increased during colder periods in the 19th and 17th centuries, and was accompanied by increased frequencies of high magnitude deposition events. Similar large deposition events during the instrumental weather period are associated with rate, intense rainfall events and suggest that the coldest period of the Little Ice Age were substantially wetter. While no long systemic hydrological records exist to compare to the sediment yield data, yield estimates during the instrumental period (post-1948) are coincidentally similar to the mean conditions of the past 5 centuries, suggesting that recent hydroclimatic responses in the region are not exceptional in the context of past changes. This information provides a sensitive environmental record of conditions in the central and western arctic islands at a time when other records show reduced inter-annual variance, thus providing a clearer view of the long-term response of the region to climate change, particularly changes associated with human modifications to atmospheric chemistry. The results also show that varved lake records can provide a new source of long-term data.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Nicholay Lake, Nunavut

97-016 MARSHAL, J.P. (1997). Analysis of predation data from moose-wolf systems. M.A. Thesis, Department of Life Sciences, University of Alberta.

ABSTRACT/DESCRIPTION:

This work examines some assumptions researchers make about the nature of wolf numerical and functional responses to moose, and about the impact of wolf predation on moose populations. To address these assumptions, the fit of linear models to functional and numerical response data from wolf-moose systems was assessed. These predation data were described better by linear models than by hyperbolic models based on predator-prey theory. Linear functional and numerical response models produced a total predation model indicating that wolves might drive low-density populations to extinction. However, simulations using these linear models suggested that persistence of moose at low densities was possible if the population was divided into sub-populations, with some having high growth rates and densities, and wolves concentrating on only the high-density parts. These high-density sub-populations persist by remaining above densities where predation could cause extinction. The sub-population idea is corroborated by low-density estimates reported in moose population surveys that are weighted averages of high- and low- density areas, where a majority of the survey is composed of low-density sub-populations that might experience little wolf predation.

DISCIPLINE: Biology

FIELDWORK LOCATION: Yukon

97-017 ROSS, J.M. (1997). A paleoethnobotanical investigation of GUS Norse Farm Site, Western Settlement, Greenland. M.A. Thesis, Faculty of Graduate Studies, University of Alberta.

ABSTRACT/DESCRIPTION:
Garden Under Sandet (GUS) is a Norse age central farmstead in the Western Settlement of Greenland. Archaeo botanical samples were collected during the 1995 and 96 seasons; 42 of 139 samples were analysed. The Archaeo botanical remains are excellently preserved because the site was sealed by alluvium permafrost. The Western Settlement was established by the Norse in ca. AD 1000; the Greenlandic economy of the times was based on animal husbandry and hunting. The Norse relied on infields and outfields to provide fodder and construction material resulting in a heavy reliance on vegetation. The abandonment of the Western Settlement (ca. 1350) may have been caused by many factors, but of those suggested, only caterpillar attack, climate change, and non-sustainable land-use practices could influence the archaeo botanical assemblage. Norse archaeo botanical assemblages are created by dynamic formation processes which must be carefully determined. To avoid formation processes resulting in general interpretations, a specific sampling is suggested and should be implemented. Samples from the long house may indicate use of different fuels. A few anthropochores in these samples indicate that the vegetation was quickly changed. Anthropochores later dominate the samples indicating weeds became prolific. Analysis of manure showed cows ate grass or heath/outfield plants and caprines grazed on heath/outfield plants or on plants from mixed groups.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Garden Under Sandet Site, Northern Greenland

97-018 SMITH, I.R. (1997). Interpretation of diamictic sediments within high Arctic lacustrine cores. Abstracts, Canadian Association of Geographers Annual Meeting, St. John's, NF., August 21, 1997.

ABSTRACT/DESCRIPTION:
Lacustrine sediments in non-glaciated Arctic catchments are generally fine grained. Within smaller lake basins without any sizeable fluvial input, coarse-grained, pebble-rich lithofacies have not been general recognized, other than those attributed to glacial deposition or marine dislocation basins. This paper examines distinct lithofacies of pebble-rich to massive diamicts within the sediment cores of several small lake basins on northern Ellesmere Island. The lake sediments from this region are characterized by an upper clayey-silt unit, 50-145 cm, representing approximately 5000-7500 years of sedimentation. Underlying this, in 6 of the 16 lake basins cored, is a diamict, of which lengths between 0.4 - 2.1 m were recovered. The basal sediments in the other lakes cored generally consisted of a sorted sediment, which are linked to proglacial deposition. Detailed analyses of the clast fabrics and biological subfossil remains, and an understanding of the regional glacial sedimentology, supports a non-glacial origin for the core diamicts. A model is proposed for their formation that invokes freezing and rafting by the lake ice pan of the coarser, littoral sediments. The absence of such deposits elsewhere in the sedimentary record is related to the unique topoclimatic characteristics of the Hazen Plateau during deglacial and postglacial periods, properties of the ice pan, and morphometry of the lake basins.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Hazen Plateau, Ellesmere Island, Nunavut

97-019 SMITH, I.R. (1997). Deglacial and Holocene stable isotope stratigraphy of *Lobatula lobatulus* - Hoved Island, Canadian Arctic. Poster Presentation, 15th Annual Arctic Workshop, Ottawa, Ontario, March 1997.

ABSTRACT/DESCRIPTION:
Analyses of the stable oxygen and carbon isotope stratigraphy of the *Foraminifera Lobatula lobatulus*, were used to reconstruct aspects of the deglacial and Holocene paleoenvironment of SW Ellesmere Island. Evidence from stable isotopes, core sedimentology, and sub-fossil remains suggests that prior to 9.3 ka BP, the Hoved Island region was occupied by a glacial ice shelf formed from a previously grounded ice sheet of unknown extent. The absence of stable oxygen isotope depletion between 8.8 and 7.6 ka BP, indicates that deglaciation

commenced with the breakup of the ice shelf and mostly marine-based margins by calving en masse, with little melting. This is consistent with studies of glacioisostasy in the area, which indicate limited postglacial uplift in this period. Between 7.6 and 4.9kaBP, ice margins retreated progressively, with intense glacial meltwater input between 7.6-7.0 and 6.3-5.7kaBP. After 4.9kaBP, a regional cooling ensued, punctuated by intervals of increased melting around 4.8, 4.4, 3.8 and 2.9kaBP. The magnitude of these events is difficult to assess due to the ongoing glacioisostatic uplift of the basin, i.e., the same isotopic dilution over time would require less input of glacial meltwater. Thus, sediment cores from marine isolation basins can provide a qualitative record of stable isotope changes, where logistical and environmental constraints otherwise limit the ability to retrieve sediment cores from marine channels.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Hoved Island, Beaumann Fiord, Ellesmere Island, Nunavut

97-020 STEINHILBER, M. (1997). Cisco diversity in northeastern Alberta: A multi disciplinary approach. Poster Presentation, University of Alberta, February 23, 1997.

ABSTRACT/DESCRIPTION:
The primary objective of this study is to resolve the taxonomy of cisco (*Coregonus spp.*) in northeastern Alberta by examining the morphology, genetics, and ecology of specimens from seven lakes in the Precambrian Shield area. The study will centre on Barrow Lake, the only site in the province known to contain the provisionally identified shortjaw cisco *(C. zenithicus)* which occurs here sympatrically with the common lake cisco (*C. artedi).* Analysis of morphometric and meristic characters used traditionally to discriminate among cisco species will be augmented by truss analysis of overall body shape. Microsatellite DNA markers and mitochondrial DNA sequences will be compared to determine if these data corroborate the morphological results. Ecological variables will be compared among sites to determine if a relationship exists between the environment and the forms of cisco observed. Preliminary findings demonstrate a diverse assemblage of cisco morphotypes in the study area but suggest the putative *C. zenithicus* in Barrow Lake may be sufficiently distinct from other forms to warrant separate species status.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Barrow Lake, Northern Alberta

97-021 WASYLUCHA, D. (1997). Analysis of organic residue from Siberian Neolithic Pottery. Research Report, Faculty of Science, University of Alberta.

ABSTRACT/DESCRIPTION:
Nine ceramic residue samples and one reference soil sample were selected for Gas Chromatographic and Mass Spectrometer (GCMS) analyses in the spring of 1997. Additionally, of the latest samples to arrive from Russia this summer, plans are to further analyse some of these ceramics. Results have now been obtained for the GCMS results spring analyses. These were all previously collected samples, and the results show a marked difference from the earlier samples that were taken from fresh excavations. They show, by preliminary analysis, organic content preservation, specifically fatty acid presence. However, the relative quantities of fatty acids and the absence of a wider range of organic compounds suggest that the effects of prolonged exposure to basic elements of deterioration have taken their toll. Again, this is from a preliminary review of the results, further testing and consideration of previous tests are still to follow. The final report forthcoming will consist of an entire encapsulation of the project from beginning to end, and published in a thesis and in scientific journals.

DISCIPLINE: Anthropology

FIELDWORK LOCATION: Siberia, Russia

97-022 WILSON, B. (1997). Regeneration dynamics of alpine larch (*Larix lyallii*): a gradient analysis. Research Report, Department of Life Science, University of Alberta.

ABSTRACT/DESCRIPTION:
Alpine larch (*Larix lyallii*) is a deciduous conifer that occurs in subalpine forests and throughout timber line over a limited geographic distribution in southwestern Canada and north-western United states. Little information exists about the regeneration requirements of this species. There is concern that alpine larch and other high altitude plant species may be adversely affected by rapid climatic change and the increase of forest management prescriptions (e.g., logging and fire suppression) at these higher elevations. This study will build in the existing general ecological and physiological research by modelling the response of alpine larch populations to environmental gradients which may be associated with natural disturbance and a variety of different stand age and topographical conditions. The aim of this research is to provide a management tool to aid in subalpine forest and timber line conservation by predicting where successful larch regeneration is likely to occur and to provide current information about this important wildlife habitat and aesthetic natural heritage feature.

DISCIPLINE: Biology

FIELDWORK LOCATION: Northern Alberta

97-023 WILSON, M.V.H., SOEHN, K.L., HANKE, G.F. and MARSS, T. (1997). "Preliminary vertebrate biostratigraphy of the Silurian Avalanche Lake sections, Mackenzie Mountains". Ichhyolith Issues, special publication, 2: 26-27.

ABSTRACT/DESCRIPTION:
The Avalanche Lake sections are intensively studied exposures of the inter-tonguing Road River and Delorme Formations in the Mackenzie Mountains, western N.W.T. Important heterostracan and *Thelodonti* elements of the vertebrate fauna have been described, but the stratigraphic significance of the vertebrates is only now being addressed. Both fossils fall into two strategically distinct assemblages that may provide to have biostratigraphic utility. The lower heterostracan assemblage includes *Athenaegis chattertoni*, cf *Tolypelepis sp.* and at least 8 undescribed cyuathaspidiform genera and species. The lower *Thelodonti* assemblage consists of *Lanardia horrida* with *Thelodonti gen*, et sp. nov. and the Silurian "fork-tailed *Thelodonti*". The upper heterostracan assemblage includes numerous cyathaspidiforms representing new genera and species. The upper *Thelodonti* assemblage is characterized by *Loganellia martinsoni* and *Loganellia sp.* nov. Conodont biostratigraphy of the AV sections published by over and *Chatterton*, together with trilobites studies that allow correlations with graptolite bearing strata in Arctic Canada and elsewhere suggest Late Telychian to Early Sheinwoodian ages for both the lower heterostracan and lower *Thelodonti* assemblages, and Early to Late Homerian ages for both of the upper assemblages. Clarification of the ages of these assemblages, and new information should help in correlation of vertebrate-bearing beds in this region.

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

97-024 **HICKS, S.L. (1997).** Compensatory Growth of Three Herbaceous Perennial Species: The Effects of Clipping and Nutrient Availability. M.A. Thesis, Faculty of Graduate Studies, Department of Botany, University of British Columbia.

ABSTRACT/DESCRIPTION:
This study focuses on the active responses of plants to herbivore damage, specifically on the ability of plants to regrow following an episode of herbivory. The Continuum of Responses model (CRM) and the Growth Rate model (GRM) make some conflicting predictions about the effects of soil nutrient availability on compensatory growth by grazed (clipped) plants. A factorial field experiment was conducted to examine the effects of long-term fertilization, short-term fertilization and clipping on the rate of (re)growth and the amount of (re)growth of three herbaceous perennial species, *Achillea millefolium*, *Festuca altaica* and *Mertensia paniculata*. Plants were collected from areas with different soil nutrient levels (low soil fertility and high soil fertility), planted in a common garden in the field and subjected to one of three simulated herbivory events (0 percent, 50 percent and 100 percent leaf loss) and one of two fertilizing treatments (no fertilizer and fertilizer addition). Concordant with both models, clipping was detrimental to plant growth which decreased as clipping intensity increased. From the plant's perspective, the impact of herbivory on the proportional leaf area of clipped plants relative to unclipped controls, was independent of short-term fertilization. When biomass was measured, short-term fertilization reduced the compensatory ability of *A. millefolium* and *M. paniculata*, but improved it for *F. altaica*. From the animal's perspective, the impact of herbivory on the absolute size of term fertilization, regardless of clipped plants relative to controls was reduced by shore species and the measure of growth considered. Under natural soil nutrient conditions, *M. paniculata* is more likely to compensate for leaf loss than *A. millefolium* and *F. altaica*. These results indicate that short-term nutrient availability may affect the compensatory growth of clipped plants, but compensatory responses of the three species studied were only partly consistent with the predictions of the two models.

DISCIPLINE: Botany

FIELDWORK LOCATION: Kluane, Yukon

97-025 **JOHN, E., TURKINGTON, R. and BREEN, K. (1997).** "A 5-year study of the effects of nutrient availability and herbivory on two boreal forest herbs". Journal of Ecology 1997, 85: 419-430.

ABSTRACT/DESCRIPTION:
The responses of populations of *Mertensia paniculata* (bluebells or lungwort) and *Anenione*

parviflora (small-flowered anemone) to herbivore exclosure and fertilization in a factorial experiment were monitored over a 5-year period beginning at peak herbivore (hare) densities during the snowshoe hare population cycle. For each species the population density, number and size of leaves and the number of flowers were measured. Both species responded more strongly to fertilizer addition than to the exclusion of herbivores. *Mertensia* produced more flowering stems, more leaves per stem, and stem density increased in the fertilized plots. Fertilizing increased total leaf length per plant for non-flowering stems but this was not observed for flowering stems. However, the net effect of having more flowering stems and having greater leaf area on nonflowering stems was to increase the total leaf area of the population. The responses of *Mertensia* make it likely to become a stronger competitor in a more productive plant community. *Anemone* showed contrasting responses at both individual and population levels. While individual stems produced slightly more leaves in fertilized plots, the density of stems declined. There were no strong effects on either leaf size or flowering. There was evidence of higher leaf turnover in fertilized plants. Meanwhile, control and exclosed unfertilized plots showed an increase in population density. The weak responses to herbivory may be explained by the timing; this part of the experiment was run during a period of declining herbivore activity. However, observed interaction effects suggest that those herbivores remaining in the system may be attracted to fertilized plots. It is planned to continue the experiment for at least another 5 years through, and beyond, the next hare peak.

DISCIPLINE: Botany

FIELDWORK LOCATION: Kluane Lake, Yukon

97-026 **FROESE, D.G. and HEIN, F.J. (1997).** An Interglacial Placer Deposit Setting: A Lesson from the Klondike Area. Poster Presentation, Yukon Geoscience Forum, Whitehorse, YT., November 25, 1997.

ABSTRACT/DESCRIPTION:
An intermediate level terrace near Dawson City was recognized to contain significant economic concentrations of placer gold in the late 1980s. Regional surficial mapping has shown the distribution of many high level terraces of pre-Reid, Reid and McConnell age in central Yukon, but the relationship between economic gold concentration and terraces is not well understood. Sedimentological study of an intermediate level terrace near Dawson City suggests two river types have been dominant: the first, a wandering gravel bed river is characterized by moderate sinuosity, lateral accretion deposits, limited sand facies, and generally fine gravel; the second, proximal braided river is characterized by multiple channels, very thick and crudely imbricate gravel, low bed relief, and a greater than 100 percent increase in maximum particle size from the lower wandering gravel bed deposit. The gold-bearing wandering gravel bed river assemblage is typical of present-day conditions with river processes dominated by lateral migration and high gravel transport rates through the system, conducive to heavy mineral concentration during an interglacial period. The 'proximal braided river' is characteristic of nearby glacial ice and rapid sedimentation resulting in poor heavy mineral concentration. The transition from a wandering gravel bed river to a proximal braided river is suggested to mark the onset of a pre-Reid glaciation in the Southern Ogilvie Mountains. The sedimentology of the intermediate terrace gravels suggests a geomorphic model which may be used for exploration of terrace placer deposits in central Yukon with a similar pattern of regional glaciation influencing terrace formation.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Yukon

97-027 **FROESE, D.G., et al (1997).** Sedimentology and paleomagnetism of Pliocene-Pleistocene lower Klondike valley terrace sediments, west-central Yukon. Proceedings of Canadian Quaternary Association 8th Biannual Meeting, Montreal, Québec, May 22-25, 1997.

ABSTRACT/DESCRIPTION:
The lower Klondike River valley and its gold-bearing tributaries, Bonanza and Hunker Creeks, west-central Yukon, contains some of the best preserved and exposed Pliocene to early Pleistocene sediments in the Canadian Cordillera. In this study, detailed sedimentologic and paleomagnetic evidence is used to present a reconstruction of depositional environments

correlated to the geomagnetic polarity time scale. In Pliocene pre-glacial times, gold bearing tributaries of the Klondike River, Bonanza and Hunker Creeks, deposited the White Channel Gravel as braided river alluvial fans with repeated cycles of aggradation and incision during the late Gilbert and Gauss chrons. Climatic cooling in the late Pliocene resulted in White Channel aggradation and the first evidence of periglacial conditions (ice wedge growth). Synchronous with alluvial aggradation in the unglaciated tributaries, and interfingering with distal upper White Channel Gravel, the Klondike washed gravels record the first proglacial outwash in the Klondike valley during the late Gauss (magnetically normal >2.6 Ma). This outwash can be traced southeast to the Tintina Trench and was likely a result of the first late Pliocene advance of the northern Cordilleran Ice Sheet. In the Pleistocene, incision and subsequent aggradation of the Klondike valley resulted in an intermediate terrace with three successive depositional environments: (1) a lowermost interglacial wandering gravel bed river sequence; (2) deposition of a proximal braided river assemblage, indicating aggradation during a pre-Reid glacial event followed by incision and abandonment of the terrace level; and (3) beginning of loess deposition. Paleomagnetic results of these previously unreported loess and reworked loess sediments indicate deposition through much of the Matuyana (2.6 - 0.78 Ma) and Bnmhes (<0.78 Ma) chrons, suggesting the dominance of katabatic winds in this area of Beringia during the early to middle Pleistocene. By Reid time (ca. 200 ka) the lower Klondike River and its tributaries were near their present levels.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Klondike River Valley, Yukon

97-028 HODDER, D.N. and SPRATT, D.A. (1997). Subsurface 3-D Geometry and Structural History of the Southern MacKenzie Mountains, N.W.T., Yukon and B.C. Slave-Northern Cordilleran Lithospheric Evolution. Slave Northern Cordillera Lethospheric Evaluation and Cordilleran Tectonics Workshop, Combined Meeting, Calgary, Alberta, March 7-9, 1997.

ABSTRACT/DESCRIPTION:

Renewed interest in seismic interpretation of the southern MacKenzie Mountains reveals a complex structural history of compressional and oblique motion on low angle thrust, high angle reverse faults and reactivated normal faults. At the surface, this complex history is expressed through the northeast deflection of the Rocky Mountain fold and thrust belt at 60'N latitude and the oblique trend of several structural elements, including the Pointed Mountain Thrust, the La Biche anticline and the Liard syncline. Reversals in thrust vergence are quite common and can be found in the La Biche and Kotaneelee Ranges. Seismic interpretation has focussed on two seismic lines from northeastern British Columbia, producing a regional picture of the structural geology, including fault linkages, within the study area. Together, the seismic lines form a regional east-west cross-section that extends from the Beaver River Gas Field to slightly east of the Bovie Lake Fault Zone. The

interpretation involves a thin-skinned compressional overprint on a thick-skinned framework of half grabens active during the deposition of middle Devonian to Mississippian sediments. The thrust faults generally have relatively low ramp angles and sole into a lower detachment. Where possible, stratigraphic information was incorporated in the interpretation through the use of surface maps and well data./→

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Fort Liard, Yukon

97-029 **HAYES, M. (1997).** Methodology and Preliminary Findings of the Chisasibi Youth Ethnography. Research Report, Department of Sociology and Anthropology, Concordia University.

ABSTRACT/DESCRIPTION:
One of the primary objectives of the study is to attemps to understand how the teenager and newer forms youth culture have created and have become part of Chisasibi town-life. The primary research method that was used for my study was participant observation. Hte second method of collecting data was through the use of formal interviews. These interviews were with adult community officials working with young people, young adults on the Youth Council and young people in the community at large. Through preliminary reviews of the data, I have begun to develop theoretical themes and subthemes for the ethnography. The central theme for the narrative that I am developing involves young people's negotiation of town-life identities, in a rapidly changing community in two ways: First, by appropriating southern popular cultural symbols; and second, by reinventing local tradition by appropriating generic Native symbols. →/←

DISCIPLINE: Sociology

FIELDWORK LOCATION: Chissasibi, Northern Québec.

97-030 **WHITE, L.-A. (1997).** Nunavut Hunters Support Program: an Evaluation of the Early Years. Proceedings, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
This paper is based on a study of Inuit concerns about a support program for hunter. The program, known as the Nunavut Hunters Support Program (NHSP) was established in 1993 to provide assistance to individuals in the form of equipment. ←/→ Criticism has come from various levels including several articles published In Nunavut's major newspaper Nunatsiaq News. These concerns centre on the criteria used for the selection of applicants, including how to define a hunter, the effectiveness and efficiency of the Program's administration and the extent to which the Program is meeting its objectives. This paper attempts to report some of the opinions and concerns expressed by Inuit in Iqaluit and Kangiqtugaapik.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Kangiqtugaapik, Nunavut

97-031 **DUMBRELL, M. and MARTINI, I.P. (1997).** A Geotechnical Analysis of the Stratigraphic Control of River Bank Failure in a Subarctic Region. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C, November 28-30, 1997.

ABSTRACT/DESCRIPTION:
The river banks along the upper estuaries reaches of the Moose River in Northern Ontario suffer continual degradation in terms of erosion and failure. Large rotational slump failures threaten the loss of valuable land for the growing community of Moosonee. The goal of this project is to determine the stratigraphic control of bank failure along the Moose River. The physical properties of the bank sediment and pore water pressure behind the bank are suspected to be significant determinants to bank failure occurrence. The ancient Tyrrell Sea clay at the base of the bank is likely the stratigraphic unit responsible. The results of this study are expected to show that under certain pore water pressure and shear strength conditions failure will occur.

DISCIPLINE: Geology

FIELDWORK LOCATION: Moose River, Hudson Bay, Northern Ontario

97-032 **GLEMET, H.C., GERRITS, M.F. and BALLANTYNE, J.S. (1997).** "Membrane Lipids of Red Muscle Mitochondria from Land-Locked and Sea-Run Arctic char, *Salvelinus alpinus*". Arctic, 129:673-679

ABSTRACT/DESCRIPTION:
Although laboratory studies of the effects of temperature, salinity, and diet on biological membranes of fish indicate substantial alterations in phospholipid and fatty acid composition to maintain functional properties, there are few parallel studies of wild populations. We, therefore, examined the red muscle, mitochondrial phospholipids and phospholipid fatty acids in two fish populations differing in their environmental temperature, salinity, and diet. Sea-run and freshwater (land-locked) Arctic char (*Salvelinus alpinus L.*) were collected from Igloolik Island, Northwest Territories, Canada, in the summer of 1991. Several differences between the phospholipids of these fish, and those reported for red muscle mitochondria in other fish species, included a higher cardiolipin content and a higher proportion of short-chain monoenes, especially 16: 1. In congruence with previous studies of changes in cardiolipin fatty acids in other species of cold-acclimatised fish, the fatty acid content of cardiolipin of both Arctic char groups was more saturated and less polyunsaturated than in warm-acclimatised fish. Other aspects of the lipid composition of these membranes were not consistent with laboratory studies of cold-acclimatised fish. For example, the fatty acids

comprising phosphatidylethanolamine and phosphatidylcholine were more saturated than would be predicted based on laboratory studies of cold-acclimatised fish. Some of these differences may be attributable to differences in the proportions of dietary n3 and n6 fatty acids in freshwater and marine environments. A strategy common to both groups of Arctic char is the maintenance of a similar relationship between phospholipid fatty acid chain length and degree of unsaturation in both Arctic char populations in spite of differences in diet and thermal regimes. The observed differences in membrane composition between land-locked and sea-run fish presumably act to maintain mitochondrial function in these different environments.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Igloolik, Nunavut

97-033 SHEATH, R.G. and MULLER, K.M. (1997). "Distribution of macro algae in four drainage basins in the high Arctic". Arctic, 50:355-364.

ABSTRACT/DESCRIPTION:
Eighty-three stream reaches were sampled from four drainage basins in the central portions of Axel Heiberg and Ellesmere Islands. The streams included small snowmelt tributaries, those flowing through wetlands, pond outflows, glacial meltwaters, and large trunk rivers, some of which had become braided in their lower portions. Larger channels tended to be quite turbid, and macroscopic algae were negligible in these reaches because they lack adequate light and hard substrata for attachment. The overall stream macro algal flora was relatively small (15 species) compared to that of other regions of the North American tundra. Cyanobacteria and Chlorophyta accounted for all but one species. The most widespread species was the colonial cyanobacterium, *Nostoc commune*. Only *Scytonema mirabile* (*Cyanophyta*) was a new addition to the stream macro algal flora of arctic North America. The number of species per stream reach ranged from 0 to 5, with a mean of 1.3. The amount of stream bottom covered by macro algae was 0 to 75 percent, with an average of ca. 5 percent. Both species number and percent cover per reach are relatively low.

DISCIPLINE: Botany

FIELDWORK LOCATION: Ellesmere and Axel Heiberg Islands, Nunavut

97-034 ARSENEAULT, D. and PAYETTE, S. (1997). "Reconstruction of Millennial Forest Dynamics From Tree Remains in a Subarctic Tree Line Peatland". Ecology, 78(6):1873-1883.

ABSTRACT/DESCRIPTION:
Tree ring and growth from sequences of 319 black spruce (*Picea mariana*) stems buried in a treeless peatland at the arctic tree line of Northern Québec, were used to reconstruct the development of a woodland in response to climate change and fires during the last 2500 years. A high frequency of diagnostic tree rings (light rings and narrow rings) allowed the cross-dating of 142 individuals and the construction of a master chronology spanning AD 690-1591. Three floating chronologies covering 964 (=178 BC-AD 785), 349 (=587-239 BC) and 210 (=1274-1065 BC) years were also developed. The buried stems were classified as arborescent (75 percent), small fragments of unknown origin (13 percent), stumps (11 percent), and portions of stunted stems (1 percent). ←/→ The amplitude of these ecosystem changes at tree line does not mirror that of climate change. Hence, it is concluded that climate and vegetation reconstructions from proxy indicators cannot portray full ecological impact, because vegetation change at tree line is nonlinear relative to climate change.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Boniface River, Northern Québec

97-035 ARSENEAULT, D. and PAYETTE, S. (1997). "Landscape change following deforestation at the arctic tree line in Québec, Canada". Ecology, 78(3):693-706.

ABSTRACT/DESCRIPTION:
This study examines the influence of fire-induced deforestation in well drained conifer sites on the development of adjacent, surviving spruce stands in peatlands at the arctic tree line (northern Québec). Tree-ring and growth-form patterns of cross-dated black spruce (*Picea mariana*) remains in peat were used to analyze stand response in two contrasting topographical settings: a moderately protected valley-bottom peatland, and an exposed hilltop peatland. Dense, old-growth spruce populations occupied the studied peatlands between the 11th and 16th centuries, with stunted and erect spruce dominating the hilltop and the valley sites, respectively. Spruce continued to colonize the peatlands as long as the adjacent well-drained sites were occupied by forest trees able to attenuate the damaging effect of winter snow-drifting conditions. The surviving conifer stands exhibited similar growth responses following deforestation of the well-drained sites by wildfire AD 1567-1568. These responses included dieback of supra-nival (above snow) stems and death of trees due to drowning in permafrost-induced ponds. The postfire degradation and disappearance

of the conifer stands from the peatlands were the ultimate stage of a positive feedback process triggered by a modification of the snow regime at the landscape scale. Deforestation of the well-drained sites led to reduced snow accumulation and enhanced snow-drift exposure, thus inducing permafrost aggradation and drainage impediment in the nearby peatland sites. While the hilltop conifer stand responded immediately to forest exclusion in the nearby sites, ecosystem changes in the valley peatland were delayed until AD 1580-1590, at the beginning of the Little Ice Age. Our results emphasize the sensitivity and connectedness of adjoining ecosystems to fire and frost disturbances in a changing subarctic landscape mosaic.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Boniface River, Northern Québec

97-036 BOIVIN, S. et BÉGIN, Y. (1997). Impact de l'aménagement hydroélectrique : une analyse dendrochronologique de l'épinette noire sur une île située au nord du réservoir Robert-Bourassa, Québec nordique. Thèse de baccalauréat, Département de géographie, Centre d'études nordiques, Université Laval.

RÉSUMÉ/DESCRIPTION :
La réservoir Robert-Bourassa a été créé lors de la réalisation du complexe hydroélectrique La Grande, dans la région de la Baie James. Sa mise en eau, terminée en 1979, a considérablement modifié le milieu naturel ainsi que les conditions climatiques. Ce mémoire cherche à connaître l'impact climatique produit par cette nappe d'eau et les répercussions sur la croissance des épinettes noires (*Picea mariana* (Mill.)BSP) qui occupent une île localisée au nord de ce réservoir. Une étude dendrochronologique a permis de constater que depuis 1980, le niveau de croissance des épinettes noires a subi une baisse et les pertes foliaires des arbres situés en bordure de l'île ont augmenté. Ces éléments suggèrent que les nouvelles conditions climatiques sont moins favorables à la croissance des épinettes noires et que l'emprise du vent sur les arbres exposés s'est accrue.

DISCIPLINE: Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Réservoir Robert-Bourassa, Nord du Québec

97-037 BOIVIN, S. and BÉGIN, Y. (1997). "Development of a black spruce (*Picea mariana*) shoreline stand in relation to snow level variations at Lake Bienville in northern Québec". Canadian Journal of Forest Research, 27(3):295-303.

ABSTRACT/DESCRIPTION:
This study proposes a reconstruction of the past development of a forest stand submitted to

long-term variations of snow levels. As of the 19th century, a gradient in tree-growth forms developed in a post-fire shoreline stand. This expansion was marked by three stages. (1) Prior to 1845, the effects of fire (between 1806 and 1826) increased the exposure stress on surviving trees, which started to develop irregular growth forms in response to niveo-eolian erosion. Post-fire regeneration expanded progressively toward the inner part of the island. (2) Afterwards (1845-1880), severe winter and summer conditions were marked by numerous unsuccessful snow-air interface breakthroughs, as shown by frequent loss of apical dominance. (3) Since 1880, the densification of above-snow tree structures contributed to the over accumulation of snow that caused many injuries to trees (branch tearing, stem bending). The frequent damage (since the 1900s) and the raised level of above-snow erosional features (loss of apical dominance) indicate that increasing forest density merely exacerbated the rising trend of snowfalls in the forest studied. This trend, demonstrated earlier in the northern areas of the forest-tundra, was not yet documented at the limit of the southern boreal forest.

DISCIPLINE: Physical Geography.

FIELDWORK LOCATION: Lake Bienville, Northern Québec

97-038 **BRUNEAU, D. et GRAY, J.T. (1997).** "Écoulements glaciaires et déglaciation hâtive du nord-est de la péninsule d'Ungava, Québec, Canada". Canadian Journal Earth Science, 34:1089-1100

ABSTRACT/DESCRIPTION:

Studies of the lithological composition and carbonate contents in the till, the glacial striations and the glacial geomorphology allowed the identification of two distinct ice flows at the northeast end of the Ungava Peninsula and in the area of the Hudson Strait. A general northeastward ice flow, from the Ungava Plateau, has marked the overall region. It joined to an eastward ice stream occupying the Hudson Strait that left traces on Charles Island. This ice stream evacuated the Foxe Basin and the Hudson Bay and overlapped to a limited extend the head of the Ungava Peninsula at Cape Nouvelle-France. The thinness of the till associated with the Ungava flow, the presence of perched blocks among which some are pedestal, and the lack of tapered forms suggest the presence of a ice with low content of debris and cold base in some areas. Subsequently to the westward glacial recession from the Hudson Strait, a readvance of the Ungava glacier with northeast-north direction intersected the earlier eastward movement and calved in the strait at the North of Charles Island. New 14 C dating by accelerator mass spectrometry on marine mollusks permitted to locate the déglaciation of the plateau margin, between Deception Bay and Cape Nouvelle-France, prior to 8.5 ka BP. Many older dates suggest the possibility of a very early opening of the Hudson Strait, as early as 10. 5 - 11 ka BP. The early deglaciation in some areas could explain the very high levels of the marine limit of the transgression observed at Cape Nouvelle-France. Furthermore, many ages are intersecting the interval of 8.4 - 8.9 ka BP, making suspicious the chronology of the glacial readvance of Noble Inlet across the Hudson Strait to the east.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ungava Peninsula, Hudson Bay, Northern Québec

97-039 GAGNÉ, M. et HOULE, G. (1997). Effet de l'embrun salin, de la salinité du sol et de l'ensablement sur la croissance et la survie des plantules de *Honcken peploides* et *Elymus mollis*. Présentation, Commission Géologique du Canada, Forum 1997, Centre géoscientifique de Québec, Université Laval, Québec, 20-22 janvier 1997.

RÉSUMÉ/DESCRIPTION :
Les plantes des dunes côtières subissent d'importants stress environnementaux susceptibles de limiter l'émergence, la croissance et la survie des plantules. L'intensité de ces stress est généralement plus élevée sur le haut de la plage et décroît en s'éloignant de la côte (c.-à-d. embrun salin, salinité du sol, ensablement, disponibilité des nutriments). Plusieurs études suggèrent que l'embrun salin et la salinité du sol, ou l'ensablement, sont les facteurs les plus importants qui régissent la distribution des espèces en milieu dunaire. Sur le système dunaire de Poste-de-la-Baleine, *Honckenya peploides* est restreint sur le haut de la plage où il forme des dunes embryonnaires; il est remplacé sur la dune bordière par *Elymus mollis*. À partir d'expériences en serre, nous avons évalué la tolérance relative des plantules de H. peploides et *E. mollis* à l'embrun salin, la salinité du sol et l'ensablement. Les résultats montrent que ces facteurs affectent la croissance et la survie des plantules des deux espèces mais celles de *E. mollis* sont plus tolérantes. La prise de mesures abiotiques sur le terrain montre que la salinité du sol et l'ensablement sont plus importants sur les dunes embryonnaires que sur la dune bordière. Ainsi, bien que les plantules de *H. peploides* évoluent en conditions naturelles dans un milieu où la salinité du sol et l'ensablement sont plus importants, elles sont moins tolérantes à ces facteurs que les plantules de *E. mollis* à la distribution de ces deux espèces sur les dunes côtières est inconsistante avec leur tolérance respective à ces facteurs abiotiques; d'autres peuvent donc contrôler la distribution des espèces en milieu dunaire.

DISCIPLINE : Biologie

LIEU DU TRAVAIL SUR LE TERRAIN : Poste-de-la-Baleine, Nord du Québec

97-040 GAGNÉ, M. et HOULE, G. (1997). Écologie comparée de la colonisation des dunes bordières de Poste-de-la-Baleine, Québec subarctique, par *Elymus mollis* et *Honckenya peploides*. Présentation, 65e Congrès de L'ACFAS, Université du Québec-à-Trois-Rivières.

RÉSUMÉ/DESCRIPTION :
Deux variables (formations superficielles et structures végétales) ont été introduites numériquement à l'intérieur d'un SIG afin d'élaborer une carte de distribution du pergélisol

à l'échelle régionale. Une seconde carte de la distribution du pergélisol réalisée par photo-interprétation et levés de terrain a pu être comparée avec celle obtenue à l'aide du SIG. Les deux cartes concordent à un taux de 92 pour cent. L'analyse des variables a permis de constater l'importance marquée des formations superficielles sur la répartition du pergélisol. Dans la région pilote, la nature du sol doit être considérée comme la variable la plus significative et dans les tills à matrice fine. La physionomie végétale, par le biais du contrôle qu'elle exerce sur le couvert nival, s'avère la principale variable complémentaire permettant de cartographier précisément la présence de pergélisol 6 l'intérieur des zones de sédiments fins.

DISCIPLINE : Sciences environnementales/écologie

LIEU DU TRAVAIL SUR LE TERRAIN : Kuujjuarapik, Nord du Québec

97-041 GIUGNI, L.-P., GRAY, J.T. et CAVAYAS, F. (1997). L'utilisation de la télédétection pour la cartographie des dépôts glaciaires sur l'île Akpatok, Baie D'Ungava, T.N.-O. Présentation, Association canadienne pour l'étude du Quaternaire 8ième réunion bi-annuelle, Montreal, Québec, 22-25 mai 1997.

RÉSUMÉ/DESCRIPTION :

Dans le cadre de la reconstitution des derniers mouvements de l'Inlandsis Laurentidien, la localisation de l'île Akpatok, près de la confluence de deux exutoires importants de langues glaciaires - la baie d'Ungava et le détroit d'Hudson, nous est apparue stratégique. Nous croyons qu'elle est susceptible de détenir les empreintes permettant d'expliquer l'évolution des masses de glace au Wisconsinien supérieur dans la baie d'Ungava. La répartition des dépôts meubles glacio-génétiques autochtones et allochtones sur l'île Akpatok est un des éléments qui aidera la compréhension de l'évolution glaciaire. Cet article propose une méthode de reconnaissance de tels dépôts par télédétection, complémentaires aux approches géomorphologiques traditionnelles. Cette méthode est basée sur la corrélation positive entre la végétation et l'abondance du matériel clastique d'origine cristalline et métasédimentaire transporté du Bouclier canadien par des langues glaciaires et abandonné comme du matériel erratique sur cette formée uniquement de calcaire paléozoïque. À partir d'un quart de scène Landsat-5 TM d'août et d'une trentaine de sites d'entraînement récoltés en 1993 et 1994, nous avons élaboré une classification permettant de faire ressortir cinq types de surfaces à glaciaire, marin, alluvial ou colluvial récents, organique et hydrique (l'eau et la neige). L'utilisation d'un indice de végétation ainsi que d'un modèle numérique d'élévation nous a permis d'estimer, pour les surfaces glaciaires, l'abondance relative du matériel erratique. La précision sur le terrain d'une telle estimation, mesurée à partir de 88 sites d'échantillonnage, est de 79 pour cent, ce qui est très acceptable pour ce type d'application. De plus, une analyse concluante de la géochimie des tills effectuée pour 9 sites confirme notre hypothèse. Nous croyons que cette méthode d'analyse pourra être exploitée pour l'étude d'autres régions éloignées de l'Arctique où les contrastes lithologiques se traduisent dans le couvert végétal.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : l'île Akpatok, Baie D'Ungava, T.N.-O

97-042 GRAY, J., LAURIOL, B., BRUNEAU, D. and RICARD, J. (1997). "Postglacial emergence of Ungava Peninsula, and its relationship to glacial history". Canadian Journal of Earth Science, 30(8):1676-1696.

ABSTRACT/DESCRIPTION:

A series of 178 radiocarbon dates, of late glacial and postglacial age, from raised marine terraces on the Hudson Strait, Hudson Bay, and Ungava Bay coasts, permit a new synthesis of deglaciation history, postglacial emergence, and glacio isostatic recovery of the Ungava Peninsula. Marine limits show three local highs, related to centres of ice loading: east of Hudson Bay; southwest of Ungava Bay, and in western Hudson Strait. Eastward extension of the latter to Cap de Nouvelle France is attributed to early deglaciation. Emergence curves are presented from sites in (1) Hudson Strait ice-free prior to 9 ka; (2) Hudson Strait; (3) Hudson Bay; and (4) Ungava Bay liberated by Ungava ice between 8 and 6 ka. a sigmoidal pattern for the first group, with slow initial emergence, contrasts markedly with a pattern of rapid deceleration of emergence for the other groups. These differences are attributed to variations in rates of ice sheet unloading, immediately after coastal deglaciation. a stable onshore ice margin kept the northeastern tip of Ungava isostatically depressed, from initial deglaciation until 7 ka, whereas other mainland coasts were only liberated by retreat of the ice margin during a final phase of rapid thinning of the continental ice sheet. Isobases on emergence since 6.5, 5, and 2 ka, derived from marine and glacial lake shoreline data, indicate maximum ice loading centres in eastern Hudson Bay and in central Québec -Labrador, with an extension northwards towards Ungava Bay. An uplift rate of 14 mm/year since 2 ka for Inukjuak on the Hudson Bay coast is compatible with very high tide gauge values, a downward gradient of 6.5 ka isobases in a northeasterly direction from southeastern Ungava towards present sea level on southern Resolution Island at the mouth of Hudson Strait suggests that Ungava Bay, despite late occupation by glacial ice, was probably not a major loading centre.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ungava Peninsula, Hudson Bay

97-043 GRAY, J.T., et al (1997). Patterns of Mountain and Continental Glaciation of the Torngat Mountains, Northern Québec-Labrador: the Geomorphological Evidence for Cold-based Ice. Presentation, Canadian Quaternary Association 8th Biannual Meeting, Montréal, Québec, May 22-25, 1997.

ABSTRACT/DESCRIPTION:
Along the western flank of the Torngat Mountains, fronting onto Ungava Bay, geomorphic evidence of ice flows obtained from striae pits, and from erratic provenance studies, reveal that during the last glaciation, major lobes from the continental Laurentide ice sheet to the west impinged upon this uplifted mountain massif. In the northernmost part of the peninsula, this continental ice clearly has overridden the summits, situated at circa 500 m elevation. In the Sheppard Lake region lateral and terminal moraine complexes indicate late glacial stable phases near the eastern front of the continental ice sheet. Further south, in the vicinity of Abloviak Fjord, where relief is in excess of 1500 m, the striae evidence and erratic evidence, indicates important outflow to the north-west, of locally developed Torngat Mountain ice. Very well developed glacial lake shorelines, and de Geer moraines, provide irrefutable evidence, however, that local Torngat ice tongues has retreated up valley to the glacial cirque zone prior to disintegration of the Laurentide ice sheet filling Ungava Bay. Extreme contrasts in sediment cover, and in weathering of bedrock at different altitudes in the Torngat Mountains were observed, as they have been previously by several researchers since the beginning of the century. Well preserved knife-edged cirques are also characteristic features of the high mountains zones, whereas subdued, worn down cirques characterise the lower plateaux edges. The hypothesis developed here is that these contrasts can be related to transitions from cold-based to warm-based thermal regimes at the base of local, thin and vigorously outflowing ice streams. In order to support this interpretation, and to provide chronological evidence for the latest, and possibly for previous glacial events, cosmo genic dating results of Fe in bedrock and erratic rock samples will be presented.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Torngat Mountains, Northern Québec, Labrador

97-044 LAVOIE, C., ELIAS, S.A. and PAYETTE, S. (1997). "Holocene fossil beetles from a treeline peatland in subarctic Québec". Canadian Journal of Zoology, 75:227-236.

ABSTRACT/DESCRIPTION:
We analyzed the fossil insect fauna of a palsa peatland located 10 km south and cast of the treeline in subarctic Québec (57°45'N, 76°15'W) to detect any changes in the species composition during the Holocene epoch and to infer past environmental conditions in the study area. A minimum of 802 beetle individuals were recovered from a 2-m peat section, representing 51 taxa (18 identified to the species level) and 8 families. *Trechus crassiscapits*, *Euctiecosion brunnescens*, and *Olophrum rotundicolle* were the most common species found in the peat. The insect assemblage was quite stable through the study interval (1850-1950 BP). The formation of the palsa (where the peat section was excavated) occurred probably after 1950 BP, raising the soil surface above water level and preventing additional peat accumulation. The proportion of boreal forest species in the faunal assemblage is high (88 percent). The only arctic (tundra) species found were *Aniara alpina* and *Pterostichus*

arcticola. Many species were out of their modern distribution range, but since collection localities are scarce in subarctic Québec, the modern range of these species may extend to the study site. A mutual climatic range analysis, employing beetles identified to the species level, showed that the mean July temperature of the study area between 1850 and 1950 BP was possibly 2.8-5.50C higher than during the 20th century. This assertion is supported by other paleoecological data (pollen and charcoal remains) suggesting a cooling trend in the study area after 2000 BP. However, since the last 2000 years are missing from the sampled peat section, it was not possible to quantify the impact of the cooling trend on the beetle fauna.

DISCIPLINE: Biology

FIELDWORK LOCATION: Nastapoka River, Northern Québec

97-045 LESAGE, L. and GAUTHIER, G. (1997). "Growth and Organ Development in Greater Snow Goose Goslings". The Auk, 114(2):229-241.

ABSTRACT/DESCRIPTION:
The tissue allocation hypothesis states that functional maturity and rapid embryonic growth are incompatible at the tissue level. This could explain why precocial birds, which have more mature tissues at hatching, grow more slowly than altricial birds. We evaluated this hypothesis in Greater Snow Geese (*Chen caerulescens atlantica*), which nest in the high arctic where the growing season is very short. We examined growth patterns and dry-matter content (an index of tissue maturation) of various tissues, and the accumulation of fat in 176 goslings collected from hatch on Bylot Island, Northwest Territories, to their staging area at Cap-Tourmente, Québec (1 to 110 days). The mass-specific growth constant (K = 0.093) of goslings was among the highest of all precocial birds, including ducks. Goslings fledged at only 68 percent of adult mass, a low value compared with other species. The timing and rate of growth differed among tissues, indicating major shifts in the allocation of protein during growth. Growth rates for body mass, body ash, and total body protein were moderate. Leg muscles and digestive organs had an early and rapid growth rate. Breast muscles had one of the highest growth rates but started to grow very late. Fat accumulation began after fledging, forcing goslings to start southward migration with very little fat reserves. In early-growing tissues (digestive organs and leg muscles), water content was low at hatch, peaked before fledging, and decreased thereafter. This contrasts with the typical pattern in birds of peak values at hatch followed by a monotonic decline during growth. The high dry-matter content of tissues at hatch could be an adaptation to increase thermogenesis of goslings in cold water. A strong inverse relationship between exponential growth rate and functional maturity was found in breast muscles but was absent in early-maturing tissues. Ecological factors seem more important than embryonic constraints in explaining fast growth rates in geese.

DISCIPLINE: Biology

FIELDWORK LOCATION: Bylot Island, Ellesmere Island, Nunavut and Cap-Tourmente, Northern Québec

97-046 MCMARTIN, S.A., WOLFE, T.A. et GOODWIN, T. (1997). Examen de la géologie des matériaux superficiels du secteur à l'étude dans le cadre du programme de cartographie de l'ouest de la Province de Churchill à répercussions sur l'exploration minière et sur les études de base en environnement. Présentation, Commission Géologique du Canada, Forum 1997, Centre géoscientifique de Québec, Université Laval, Québec, 20-22 janvier 1997.

RÉSUMÉ/DESCRIPTION :
Le programme de cartographie de l'ouest de la Province de Churchill est un projet multidisciplinaire auquel participent plusieurs organismes. Il a été amorcé par la Commission géologique du Canada dans le district de Keewatin pour dresser les cartes du substratum rocheux et des matériaux superficiels dans les zones supracrustales. La composante du programme sur la géologie du Quaternaire consistera cartographier en détail les matériaux superficiels et la composition géochimique de certaines ceintures de roches vertes et à cartographier systématiquement, à l'échelle régionale, les indicateurs de l'écoulement glaciaire à la ligne de partage du Keewatin. Cette ligne représente le dernier centre du Secteur de Keewatin de l'Inlandsis Laurentidien. Il existe peu de données sur la séquence des écoulements glaciaires et la migration de la ligne de partage, bien que ces événements aient influé sur tout le Secteur de Keewatin. Comme elles contribuent aux recherches métallogéniques et à la cartographie du substratum rocheux, les études portant sur le Quaternaire seront directement appliquées à l'exploration minière des zones de roches vertes, en débutant au nord de l'Inlet Rankin dans la direction de Meliadine. Les cartes, mais aussi des données sur la composition géochimique des tills et le pergélisol, constitueront le fondement de l'évaluation des répercussions environnementales.

DISCIPLINE : Géologie

LIEU DU TRAVAIL SUR LE TERRAIN : Churchill, nord du Manitoba

97-047 MÉNARD, É., MICHAUD, Y. et ALLARD, M. (1997). Analyse préliminaire du régime thermique des sols en relation avec les conditions de surface, Umiujaq, Hudsonie. Présentation, Commission Géologique du Canada, Forum 1997, Centre géoscientifique de Québec, Université Laval, Québec, 20-22 janvier 1997.

RÉSUMÉ/DESCRIPTION :
Au cours de l'été 1995, une étude sur le régime thermique des sols a été entreprise dans la région d'Umiujaq, sur la côte est de la baie d'Hudson, dans la zone de pergélisol discontinu et abondant. Cette étude avait pour objectif d'analyser les liens entre le régime thermique du

pergélisol et les conditions de surface, afin d'établir les paramètres d'identification permettant une cartographie régionale du pergélisol. La température des sols a été enregistrée de septembre 1995 septembre 1996, à l'aide de 15 capteurs miniatures installés à 5 centimètres de profondeur dans différents environnements biophysiques. Les indices de gel en surface des différents sites reflètent la diversité de la végétation et du couvert nival. Les secteurs potentiellement pergélisolés se situent en milieu ouvert, où la végétation parsemée ne peut pas retenir la neige. Dans les zones recouvertes de végétation haute et dense, les indices de gel ne sont pas élevés (< 500) et la température moyenne est supérieure à 0 °C.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Umiujaq, Baie d'Hudson

97-048 MÉNARD, É., MICHAUD, Y. et ALLARD, M. (1997). "Essai de Cartographie du Pergélisol Discontinu à l'aide d'un SIG : Détroit de Manitounuk, Québec Nordique, Canada". Permafrost and Periglacial Processes, 8:237-244.

RÉSUMÉ/DESCRIPTION :
Deux variables (formations superficielles et structures végétales) ont été introduites numériquement à l'intérieur d'un SIG afin d'élaborer une carte de distribution du pergélisol à l'échelle régionale. Une seconde carte de la distribution du pergélisol réalisée par photo-interprétation et levés de terrain a pu être comparée avec celle obtenue à l'aide du SIG. Les deux cartes concordent à un taux de 92 pour cent. L'analyse des variables a permis de constater l'importance marquée des formations superficielles sur la répartition du pergélisol. Dans la région pilote, la nature du sol doit être considérée comme la variable la plus significative. Les zones pergélisolées se retrouvent presque exclusivement dans les silts argilleux et dans les tills à matrice fine. La physionomie végétale, par le biais du contrôle qu'elle exerce sur le couvert nival, s'avère la principale variable complémentaire permettant de cartographier précisément la présence de pergélisol à l'intérieur des zones de sédiments fins.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Détroit de Manitounuk, Nord du Québec

97-049 SIMARD, M. (1997). Impact de l'aménagement hydroélectrique : une analyse dendrochronologique de l'épinette noire sur une île située au nord du Réservoir Robert-Bourassa, Québec nordique. Mémoire de maîtrise, Département de géographie, Université Laval.

RÉSUMÉ/DESCRIPTION :

Le réservoir Robert-Bourassa a été créé lors de la réalisation du complexe hydroélectrique La Grande, dans la région de la Baie James. Sa mise en eau, terminée en 1979, a considérablement modifié le milieu naturel ainsi que les conditions climatiques. Ce mémoire cherche à connaître l'impact climatique produit par cette nappe d'eau et les répercussions sur la croissance des épinettes noires (*Picea mariana* (Mill)BSP) qui occupent une île localisée au nord de ce réservoir. Une étude dendrochronologique a permis de constater que depuis 1980, le niveau de croissance des épinettes noires a subi une baisse et les pertes foliaires des arbres situés en bordure de l'île ont augmenté. Ces éléments suggèrent que les nouvelles conditions climatiques sont moins favorables à la croissance des épinettes noires et que l'emprise du vent sur les arbres exposés s'est accrue.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Réservoir Robert-Bourassa, Nord du Québec

97-050 TREMBLAY, M. (1997). Analyse densitométrique des cernes de croissance de l'épinette noire en milieu insulaire, par suite de la création du réservoir Robert-Bourassa (LG-2en Jamésie, Québec nordique. Mémoire de maîtrise, Département de géographie, Université Laval.

RÉSUMÉ/DESCRIPTION :
L'analyse dendrochronologique de la réponse climatique de l'épinette noire en milieu insulaire a permis d'évaluer l'effet de la mise du réservoir Robert-Bourassa sur la végétation insulaire. L'analyse des anomalies de croissance (bois réaction, cernes de gel, cernes pâles et canaux résinifères traumatiques), de la croissance radiale et de la densité des cernes annuels met en évidence l'apparition d'une enclave climatique en milieu insulaire suite à la création du réservoir Robert-Bourassa à l'hiver 1978-1979. Depuis la mise en eau du bassin, la végétation insulaire semble être d'avantage exposée à des conditions climatiques plus rigoureuses. La végétation des îles de faibles diamètres et de fables altitudes serait négativement influencée par des conditions climatiques maintenant plus froides et plus venteuses que dans le passé, ainsi que par un retard de la saison de croissance par rapport à la période végétative habituelle.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Réservoir Robert-Bourassa, Nord du Québec

97-051 TREMBLAY, J.-P., GAUTHIER, G., LEPAGE, D. and DESROCHERS, A. (1997). "Factors Affecting Nesting Success in Greater Snow Geese: Effects of Habitat and Association With Snowy Owls". Wilson Bulletin, 109(3):449-461.

ABSTRACT/DESCRIPTION:
We examined how habitat features affected nesting success of Greater Snow Geese (*Chen caerulescens atlantica*) on Bylot Island, Northwest Territories, Canada, under high (1993) vs low (1994) nesting success and colonial vs isolated nesting (1994 only). Because Snow Geese nested in association with Snowy Owls (*Nyctea scandiaca*) in 1993, we also examined the relationship between nesting success and distance from owl nests. Predation, especially by Arctic foxes (*Alopex lagopus*), was the main cause of nesting failure on Bylot Island. In 1993, goose nests near an owl nest had better success than those farther away, and they also tended to be initiated earlier. Few habitat features were related to nesting success, although nests located in pond habitat had lower success than those in wet meadows or moist tundra. In 1994, Snowy Owls were absent, and goose nesting success was much lower than in 1993 (23-42 percent vs 90 percent). Isolated nests located on hillsides had higher success than those located in lowlands. In contrast, colonial nests were more successful in lowland wet meadows, where tall willow bushes (*Salix lanata*) were present, than in either moist tundra or hillsides. In the latter habitat, nests associated with *Cassiope tetragona*, a plant that typically grows in depressions between hummocks, had higher success than those associated with other vegetation. We conclude that nesting in association with raptors, such as Snowy Owls, that maintain a predator-free area around their nest, was probably a dominant factor affecting Greater Snow Goose nesting success. In the absence of owls, isolated nests had higher success in hilly habitats than in lowlands, whereas colonial nests in tall willows were most successful.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Bylot Island, Nunavut and Cap-Tourmente, Northern Québec

97-052 **DROBOT, S. (1997).** Microwave Radiometry and Snow Water Equivalence Derivation over First-Year Sea Ice in the Marine Cryosphere. M.A. Thesis, Department of Geography, University of Manitoba.

ABSTRACT/DESCRIPTION:
Snow water equivalence (SWE) derivation over sea ice requires a better understanding of how variations in the evolving snow-sea ice mixture affect microwave emission. In this thesis, the effects of (a) variation in liquid water content within a seasonally dynamic snowpack and (b) heterogeneity in underlying ice are examined. Geophysical snow data and *in situ* passive microwave signatures were collected in the Canadian Arctic Archipelago during the spring of 1996 under the Collaborative-Interdisciplinary Cryospheric Experiment (C-ICE). Surface based radiometer measurements were collected at 19, 37 and 85G14z (both vertical and horizontal polarizations). Snow data and Special Sensor Microwave/Imagery (SSM/1) data were collected from 1993-1995 during the Seasonal Sea Ice Monitoring and Modelling (SIMMS) program. Results indicate SWE can be derived with an *in situ* microwave radiometer when the snowpack is dry. Multiple regression techniques are shown to better estimate *in situ* SWE over the case site. With increased water in liquid phase, emission from the snowpack causes current algorithms to overestimate SWE. Variation in ice type and spatial pattern of the ice limit the applicability of SWE derivation with SSM/I. The presence of multi year ice (MYI) lowers emissivity values that leads to an underestimation of SWE with current algorithms.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

97-053 **DROBOT, S. (1997).** "Towards development of a snow water equivalence(SWE) algorithm using microwave radiometry over snow covered first-year sea ice". Photogrammetric Engineering and Remote Sensing Article. (Missing article reference)

ABSTRACT/DESCRIPTION:
In this paper we investigate snow geophysical and microwave radiometric sensor characteristics (frequency, incidence, and polarization) as they pertain to the development of a snow water equivalence (SWE) algorithm for first-year sea ice. Physical and electrical snow properties and *in situ* microwave radiometry (19, 37, and 85GHz; V and H Pol) data were collected during a 36 day period in early 1996 under the Collaborative-Interdisciplinary Cryospheric Experiment (C-ICE). Results indicate density, liquid water content, and salinity varied significantly over the snow volume vertical dimension. Diurnal sampling indicated a difference in liquid water content. Corresponding changes in salinity and density were not

detected. Within the framework of this case study, 37GHz H polarization was the most precise single frequency for SWE estimation. Multiple regression techniques show promise as an effective avenue to pursue the development of SWE algorithms.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

97-054 **DROBOT, S. (1997).** "Heterogeneity in snow water equivalence (SWE) retrievals over snow covered sea-ice". M.A. Thesis, Department of Geography, University of Manitoba.

ABSTRACT/DESCRIPTION:
In this paper we investigate the effect of heterogeneity in snow and ice properties on microwave emissivity. Physical and electrical snow properties and *in situ* microwave radiometry (19, 3 7, and 85GHz; V and H Pol) data were collected during a 36 day period in early 1996 under the Collaborative-Interdisciplinary Cryospheric Experiment (C-ICE). SSM/I and ERS- I data were collected from 1992, 1993, and 1994. Results indicate snow liquid water content and snow-ice interface temperature had a significant effect on emissivity. Snow density had a less noticeable effect. It is also shown that variation in the physical ice composition (first-year vs. multi year) and spatial location of ice significantly affect emissivity. Real world heterogeneity is shown to be important over the case studies in all years.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

97-055 **IACOZZA, J. (1997).** Models of Snow Distribution Patterns for Various Types of Sea ice in the Canadian High Arctic. M.A. Thesis, Department of Geography, University of Manitoba.

ABSTRACT/DESCRIPTION:
The distribution of snow over first-year (FYI), multi year (MYI) and rubble (RI) sea ice were evaluated at 15 sites, sampled during two years of field research in the Canadian Arctic. A geo-statistical technique known as the variogram was used to model the statistical pattern of the snow distribution. The variogram examines the spatial continuity of a regionalised variable and how this continuity changes as a function of distance and direction. Results indicate the variogram provided a good estimate of the type and change of spatial dependence of the snow depths over various types of sea ice. Over FYI, the regular smooth ice topography produced a periodicity in the snow drifts which was best estimated using a

wave (hole-effect) theoretical variogram in combination with a Gaussian model. The more uneven ice topography characteristic of MYI and RI produced a more irregular snow drift pattern. The most appropriate models were a combination of the spherical and Gaussian variogram models (MYI sites) or a single Gaussian model (RI sites). The nugget values of the standardized directional variograms increased as the sea ice topography became more irregular (smooth FYI to large uplifted ice pieces in RI). This was attributed to the presence of snow drifts in the MYI and RI sites that were less than the sampling interval, thus producing micro-structures. Geometric anisotropy, as well as zonal anisotropy, were present in all 15 sites, indicating a directional trend in the spatial continuity of the snow distribution patterns which we attribute to the prevailing wind vector during depositional storm events.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Wellington Channel, N.W.T.

97-056 **OMELON, C. and POLLARD, W. (1997).** A geochemical and hydrological investigation of perennial spring activity at Expedition Fiord. Presentation, Association of Canadian Universities for Northern Studies, 5th Students for Northern Studies Conference, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
This paper documents the hydrologic and geomorphic characteristics of perennial springs on western Axel Heiberg Island in the Canadian High Arctic. Two groups of mineralized springs occur near the McGill Field Station at Expedition Fiord. The first group is 3 km from the terminus of the White and Thompson Glaciers discharging at the base of the east side of Gypsum Hill adjacent to the flood plain of the Expedition River. The second site is at Colour Peak near the head of Expedition Fiord, approximately 10 km down valley from Gypsum Hill. Each spring group consists of 20-40 outlets spread over several hundred square metres. The mineralized nature of the discharge is responsible for a range of precipitates and travertine deposits. This paper documents spring discharge, water chemistry, and mineral precipitates associated with the springs.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Axel Heiberg Island, Nunavut

97-057 **WAKEHAM, S. (1997).** Inuit teachers use of computers: A case study. Poster, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1998.

ABSTRACT/DESCRIPTION:
This poster describes the results of a pilot project initiated by McGill University to examine the effectiveness of new information technologies to support Inuit teachers' participation in a three-credit, mixed-mode distance education course. Results of this project suggest that technology can play an important role in northern distance education courses but there are important technological, professional, cultural, instructional, and administrative barriers that need to be addressed before the benefits of technology-assisted, mixed-mode courses can be realized. Historically, distance education programs for First Nations and Inuit learners have found limited success. Recent efforts to improve distance education programs focus on designing culturally appropriate material and improving learner-instructor interaction. A pilot project was initiated to assess the effectiveness of technology to Inuit teachers' participation in a mixed-mode distance education course. This mixed mode format combined face-to-face sessions held in teachers' home communities with email and web-assisted learning experiences. While the face-to-face sessions were very successful, the online portions were

not. Apart from the limited technological infrastructure, interviews with teachers suggest that a host of professional, cultural, instructional, and administrative barriers impeded their participation in the online section of the course.

DISCIPLINE: Education

FIELDWORK LOCATION: Pond Inlet, Nunavut

97-058 **BLANKEN, P.D. and ROUSE, W.R. (1997).** "Evidence of water conservation mechanisms in several subarctic wetland species". Journal of Applied Ecology, 33:842-850

ABSTRACT/DESCRIPTION:
We tested the hypothesis that subarctic hygrophilous plant species show poorly developed mechanisms for water conservation by measuring the stomatal conductance, transpiration rate and xylem pressure potential of the ubiquitous subarctic wetland species *Salix planifolia, S. reticulata, S. candida, Betula glandulosa, Myricagale* and *Carex aquatilis* during three warm, clear-sky days, when evidence of these mechanisms would be most prevalent. Mid-day stomatal depressions were experienced by all species except *S. candida*, with the frequency and magnitude of the depression increasing as the atmospheric humidity decreased. The mid-day stomatal depression resulted in a decrease in the transpiration rate when air temperatures were high and atmospheric humidity was low. The soil-plant resistance showed a dependence on the transpiration rate, whereby asymptotic values of the soil-to-leaf pressure potential differences were reached at high transpiration rates for all species. The implication is that these shrubs decrease their internal resistance to the movement of water at high transpiration rates in order to reduce physiological stress. In view of the sensitivity of the willow-birch community to the water supply provided by the shallow water table and root network, the implications for wetland management are discussed.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-059 **BLANKEN, P.D. and ROUSE, W.R. (1997).** "Modelling Evaporation from a High Subarctic Willow-birch Forest". International Journal of Climatology, 15(106):551-584.

ABSTRACT/DESCRIPTION:
Continuous measurements of the energy balance were made during the 199 1 growing season over a dwarf willow-birch forest located near Churchill, Manitoba. Intensive measurements of stomatal conductance for several species were taken on three fair-weather days. These represented a wide range of air temperatures and leaf-to-air vapour pressure deficits and allowed the quantification of the surface-atmosphere interaction. Modelling evaporation on a 0-5 h basis can be performed accurately using a modified version of the Penman-Monteith combination model coupled to a submodel of stomatal conductance. With a vegetated surface cover of about 90 percent at full leafing, vegetation plays an important role in the overall moisture flux because 80 percent is a result of transpiration. Simulating various

vegetation-change scenarios shows that species composition, through differences in stomatal behaviour, has a marked effect on evaporation.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-060 BOUDREAU, L.D. and ROUSE, W.R. (1997). "The role of individual terrain units in the water balance of wetland tundra". Climate Research, 5:31-47.

ABSTRACT/DESCRIPTION:
The water balance of a High Subarctic wetland was measured in a newly established research basin near Churchill, Manitoba, Canada. Measurements spanned the growing season from early June through to the end of August 1991. The watershed was instrumented such that the water budget could be monitored over each of the dominant terrain units. The study basin has 5 major terrain types consisting of sedge-dominated wetland, upland lichen-heath, tundra lakes and ponds, willow birch wetland, and open spruce forest, in decreasing order of coverage. These terrain units, and the ecosystem as a whole, are representative of coastal wetlands underlain by permafrost in the Hudson Bay Lowland. Runoff and thus stream flow were closely tied to the moisture status of the peatlands; and to the depth of the active layer. During 2 unusually dry periods, the peatlands remained wet, which indicates a lack of water mobility when the water table drops below the surface of the wetland. Streamflow response to rainfall during these periods was small in comparison to early summer when the frost table was near the surface, or to wet periods when the water table rose above the surface.→/← Each terrain type had a characteristic water balance due to differences in one or more of the hydrologic variables (evapotranspiration, runoff and storage). This has important implications concerning the impact on the water balance of a change in surface cover brought about by a change in climate.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-061 BURTON, K.L., ROUSE, W.R. and BOUDREAU, L.D. (1997). "Factors affecting the summer carbon dioxide budget of subarctic wetland tundra". Climate Research, 6:203-213.

ABSTRACT/DESCRIPTION:
This study reports on 27 days of C02 flux measurements from wetland tundra in the vicinity of Churchill, Manitoba, Canada. Fluxes were measured continuously using a portable, gradient measurement system which is described in detail. The measurements apply to a

climatically normal summer in terms of solar radiation, temperature and precipitation. The environment consists of a hummocky fen underlain by permafrost with a thick layer of organic soils. Sedges dominated the hummocks and mosses the hollows. The measurement period was composed of a dry period when the water table receded below the lowest terrain elements and a wet period when there was standing water in the hollows. On average for the measurement period, and on most days, the carbon balance was positive, meaning that carbon loss through respiration exceeded the gain through photosynthesis. Respiration was greater and photosynthesis less during the dry period than the wet period. The magnitude of the daily average C02 flux in this study was comparable to summer fluxes measured in similar ecosystems. The implications of a net carbon loss during the most photosynthetically active period are discussed.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-062 CAREY, S.K. and WOO, M.-K. (1997). Snowmelt Hydrology of two subarctic slopes, Southern Yukon, Canada. Presentation, 11th International Symposium and Workshop, Prudhoe Bay/ Fairbanks, Alaska, August 18-22, 1997.

ABSTRACT/DESCRIPTION:

Snowmelt season is when large quantities of flow are discharged from subarctic basins, but the runoff contributing areas are highly variable as are the timing and the magnitude of meltwater generation from different slopes. Two slopes in the lower Wolf Creek basin in southern Yukon were studied in 1997. The south-facing slope had a dense aspen forest which is leafless in the melt period of April-May and it is underlain by seasonal frost. The north facing slope has open stands of spruce and an organic layer that rests on mineral soils with permafrost. Snowmelt was advanced by over 10 days on the south slope which had higher radiation than the north aspect. All the meltwater infiltrated the frozen silt without generating runoff. By the time significant melt events occurred on the north slope, the frost and the snow were gone from the south. Meltwater was able to infiltrate the frozen organic soil but deep percolation was prevented by the ice-rich substrate. Lateral flow began after the organic layer was saturated, with much runoff along intermittent rills fed by diffused and pipe flows. Rills and pipes were interconnected but the drainage network and the runoff contributing area changed depending on the disposition of the snow and the water and frost table positions relative to the local topography. The hydrological contrasts between the north and south slopes have important implications on direct runoff generation in the melt period. Situations similar to the study site can be found elsewhere in subarctic North America and the observed processes have bearing upon hydrological modelling for the subarctic environment.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Wolf Creek Basin, Yukon

97-063 GLENN, M.S. and WOO, M.-K. (1997). "Spring and Summer Hydrology of a Valley-bottom Wetland, Ellesmere Island, Nunavut, Canada". Wetlands, 17(2):321-329.

ABSTRACT/DESCRIPTION:
Linear wetlands that occupy the valley bottoms in the Canadian Arctic Islands represent distinct ecological niches in the polar desert environment, but the hydrologic processes associated with such wetlands are poorly known. One such wetland, the Muskox Fen (area 3700 m^2) in central Ellesmere Island, Nunavut, was studied during a relatively dry year (1993). Hydrologic processes were most active in the spring, with snowmelt providing most of the water supply to the fen. Water storage capacity was satisfied easily, guaranteeing wetland saturation despite a low snowfall winter. At this time, the wetland was a poor regulator of run-off, the valley bottom served merely as a conduit for the basin meltwater to pass through. During the dry period in summer, the wetland received little lateral inflow from its catchment, and vertical processes of rainfall and evaporation prevailed while the water storage gradually decreased. In the wet period, saturation was restored after only moderate rainfall. For most parts of the summer, a high water table was maintained because permafrost impeded deep seepage loss, thus preventing excessive drying of the wetland vegetation.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-064 YOUNG, K.L., WOO, M.-K. and MUNRO, D.S. (1997). "Simple Approaches to Modelling Solar Radiation in the Arctic". Solar Energy, 54(1):33-40.

ABSTRACT/DESCRIPTION:
Solar radiation was modelled for an Arctic location using hourly and twice daily meteorological data. Results indicate that a total cloud model (TC_o) employing cloud opacity data and cloud layer models (CL_o) utilizing cloud opacity and cloud amount data (CL_a) perform equally well; and they are better than a total cloud model (TC_a) employing cloud amount data. The performance of TC_o, CL_o, and CL_a models improve greatly when averaged over 4 days, indicating the feasibility of utilizing rudimentary meteorological observations to broaden the radiation database for the vast Arctic region of North America.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-065 YOUNG, K.L. and WOO, M.-K. (1997). "Modelling Net Radiation in a High Arctic Environment Using Summer Field Camp Data". International Journal of Climatology, 17:1211-1229.

ABSTRACT/DESCRIPTION:
A model is presented that uses easily obtained twice-daily field data (cloud-type, amount, temperature, wind speed at 2 m) to estimate net radiation for horizontal and slope sites in a High Arctic setting. Incoming shortwave radiation is estimated using a cloud-layer model, sensible and latent heat fluxes are determined using temperature and wind data, and the surface heat flux is obtained as the residual in the energy balance equation. Surface temperature, which is required for longwave radiation, is derived using the force-restore approach. The modelled results compare favourably with field measurements for a cool and wet (1989) and a warm and dry (1990) summer at Hot Weather Creek, Fosheim Peninsula, Ellesmere Island, Northwest Territories, Canada. Significant departures in the results tend to appear during the snowmelt period, suggesting that a better understanding of rapid albedo changes during the snowmelt season is required. A better agreement in 1990 may partly reflect lower errors in incoming shortwave radiation estimates and lower wind speeds, which dampened turbulent transfers. A variable dust coefficient used in the model and the use of cloud data twice daily may partly explain the underestimate of Q* in 1989 and its overestimate in 1990. Overall, the root-mean-square error for 1990 was 14-26 per cent when net radiation was averaged over a 5 -day period. The model is useful to geomorphologists, hydrologists and ecologists interested in mapping the spatial pattern of net radiation for slopes, transects or drainage basins in northern environments.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-066 YOUNG, K.L., WOO, M.-K. and EDLUND, S.A. (1997). "Influence of Local Topography, Soils, and Vegetation on Microclimate and Hydrology at a High Arctic Site, Ellesmere Island, Canada". Arctic and Alpine Research, 29(3):270-284.

ABSTRACT/DESCRIPTION:
Influence of topography, soils, and vegetation on the microclimate and hydrology of four slopes and a plateau site located within a 1-km area in the continuous permafrost zone of Arctic Canada was studied. The field season covered two summers with contrasting climatic conditions. During the warm, dry summer (1990), the between-slope differences in radiation, and air and ground temperatures were exaggerated, while during the cloudy summer (1989), diffuse rather than direct solar radiation prevailed and the differential heating between slopes was reduced. Ground thaw increased in the warm summer, but maximum thaw depth at any site was also affected strongly by vegetation and soil characteristics, the latter being controlled by local geology and geomorphic processes. Precipitation on slopes can be

influenced by wind and snow accumulation is modified by the local topography such as slope concavities. Snow ablation was largely accomplished through radiation melt so that the albedo changes were important. Meltwater runoff was maintained only downslope of deep snowbanks, and only the lower slopes experienced continuous saturation or groundwater flow. The spatial pattern of snow accumulation, frost table configuration, and surface or groundwater flows tend to recur annually, indicating the long-term influence of topography, soils, and vegetation on hydrologic processes at the local scale. Such studies linking the spatial and temporal variability of environmental attributes on energy and water flow improve our understanding of landscape ecology in northern environments and are useful when point observations are scaled up to match the dimensions of regional climate models.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-067 **WOO, M.-K. and YOUNG, K.L. (1997).** "Hydrology of a Small Drainage Basin with Polar Oasis Environment, Fosheim Peninsula, Ellesmere Island, Canada". Permafrost and Periglacial Processes, 8:257 277.

ABSTRACT/DESCRIPTION:
The Canadian High Arctic is studded with many oases among an otherwise barren polar desert environment. This study examined the hydrological response of a small (130 km^2) catchment to the climatic and vegetation conditions special to the polar oasis environment. Hot Weather Creek basin is located on Fosheim Peninsula, Ellesmere Island, which is protected in summer from the inroad of cold air from the Arctic Ocean and sheltered from many storms. Its precipitation is among the lowest in Canada. Low pre-melt snow accumulation, high sublimation, early and rapid melt characterize the spring conditions. Evaporation is enhanced by longer and warmer summers than polar deserts located at comparable latitudes, though evapotranspiration may be inhibited by low rainfall which restricts the moisture supply. Snowmelt plays a prominent role in controlling the timing and the amount of spring discharge of Hot Weather Creek. Streamflow follows a pattern typical of the Arctic nival regime. A three-year water balance study indicates that snowmelt is the primary water source for the recharge of basin storage. A year with low winter snowfall but high rainfall will not yield much runoff since most of the summer rain is lost to evapotranspiration. The hydrological behaviour of Hot Weather Creek basin is more akin to Low Arctic catchments than to polar desert basins of the High Arctic.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-068 HIPFNER, J.M. et al (1997). "Theory of female age in determining egg size and laying date of Thick-billed Murres". Journal of Avian Biology, 28:271-278.

ABSTRACT/DESCRIPTION:
In many bird species, egg and/or clutch size increases with female age, and declines with laying date. The declines with date have been considered time-saving adaptations to seasonal environments. At Coats Island, N.W.T., Canada in 1994 and 1995, we examined the relationships among female age, laying date and egg size in the Thick-billed Murre *Uria lomvia*, an Arctic seabird that lays a one-egg clutch. In particular, we tested a model that views the seasonal decline in egg size in this species as a time-saving adaptation: the model predicts that, irrespective of their age, late-laying birds will reduce egg size. Laying dates became earlier with increasing female age to 8 years, because young birds initiated egg formation late. Egg size increased with age to 8 years, possibly because young birds deposited yolk at a slow rate. Individual effects explained much of the variation in laying date and egg size. Egg size declined with laying date in a random sample of eggs laid by birds of unknown age. However, egg size was independent of laying date among older birds. In contrast, egg size declined with laying date among young birds, but this was an effect of age, not date. Young birds that laid at the same time as older birds laid smaller eggs. These results indicate that the time-saving model does not adequately explain the seasonal decline in egg size in Thick-billed Murres. We suggest that characteristics of individual Thick-billed Murres, largely mediated by age (or experience) during early reproductive attempts, determine the size of egg they lay.

DISCIPLINE: Biology

FIELDWORK LOCATION: Coats Island, Nunavut

97-069 HIPFNER, J.M. (1997). "The Effects of Parental Quality and Timing of Breeding on the Growth of Nestling Thick-billed Murres". The Condor, 99:353-360.

ABSTRACT/DESCRIPTION:
In Thick-billed Murre, *Uria lomvia*, an Arctic seabird that raises a single chick annually, late-hatched chicks often grow slowly and depart the nest lighter in mass early-hatched chicks. At Coats Island, N.W.T., Canada, in 1994 and 1995, I examined whether the seasonal declines in growth were caused by timing of breeding (the "seasonal deterioration" hypothesis), or by late breeding of less capable pairs (the "parent quality" hypothesis). I removed the single egg front early-breeding pairs, inducing them to relay, and compared the growth of chicks from these replacement eggs to that of chicks of unmanipulated pairs. Growth rate and mass at nest departure correlated negatively with hatching date in the

general population. However, in both years the experimental chicks grew well as the chicks of unmanipulated early-breeding birds, and departed at similar mass. The experimental chicks also grew more quickly than unmanipulated chicks that hatched later in the season, in one of two years. These results support the parent quality hypothesis, but not the seasonal deterioration hypothesis. I suggest that the late breeding of less capable birds is the likely proximate cause of many of the seasonal declines in success reported frequently in the Alcidae.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Coats Island, Nunavut

97-070 ORCHARD, T. (1997). Channelling Change: The Use of Teenagers as Vehicles of Expression Among the Naskapi. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:

In this paper I will explore how the relatively new phenomenon of the teenager has affected the process of role identification and coming of age for modern Naskapi youth. From my perspective this can be done by looking beyond the "between two worlds" idea which is commonly used in studies of aboriginal youth. The life situation of Naskapi youth is more complex than one of two different cultural belief systems. Not only do the youth have to mediate a place for themselves between the two versions of Naskapi cultural identity, that of the hunting camp and that of the modern settlement, but the phase of Naskapi adolescence itself has changed. Due to the influx of Euro Canadian culture (i.e. music, dress, television, food), Naskapi youth are now very much under the influence of the larger North American 'teenage' culture. While Naskapi teenagers are greatly influenced by both North American teenage culture and the more traditional set of values and expectations, they are truly a unique social group in their own right. The particular characteristics of these young people will be shown to not only be symbolic markers of the effect of culture change on the social construction of identity, but we can also see how this change in the adolescent stage, on the one hand, compares to similar kinds of social change which are occurring in other facets of Naskapi life. on the other hand, we will learn how 'the teenager' also acts to produce a type of disjunction within the established network of cultural systems and values. To this end the traditional and contemporary expressions of youth identity among the Naskapi will be discussed, along with the concepts of cultural perception and the use of 'the teenager'.

DISCIPLINE: Sociology

FIELDWORK LOCATION: Naskapi, Northern Québec

97-071 **GRAY, J., CLARK, C., DECKER, V. and GRAY, A. (1997).** Patterns of Mountain and Continental Glaciation of the Northwest Torngat Mountains, Northern Québec-Labrador. Proceedings of Canadian Quaternary Association 8th Biannual Meeting, Montreal, Québec, May 22-25, 1997.

ABSTRACT/DESCRIPTION:
In the northernmost part of the peninsula, the continental ice clearly has overridden the summits, situated at circa 500 m elevation. Further south, in the Sheppard Lake - Eclipse Valley sector, evidence for the penetration of tongues of Laurentide ice into major low-lying valleys is found, which indicates that these must have been free of Torngat ice at this time. Lateral and terminal moraine complexes indicate at least one major late glacial stable phase during the retreat of the continental ice. Further south, in the vicinity of Abloviak Fjord, the limited striae and erratic evidence, indicates important outflow to the NW, of a Torngat Mountain ice cap. Very well developed glacial lake shorelines, and locally developed de Geer moraines, in coastal re-entrants provide irrefutable evidence, however, that local Torngat ice tongues had retreated up-valley to the glacial cirque zone prior to disintegration of the Laurentide ice sheet filling Ungava Bay, which occurred slightly before 8200 14C yrs BP, based on marine shell radiocarbon dates from a core in eastern Ungava Bay and a date on NE Akpatok Island.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Torngat Mountains, Ungava Bay, Northern Québec-Labrador

97-072 CHAURET, Y. et LAURIOL, B. (1997). Descriptions et classification des micro-structures des calcrètes de fissures du Yukon Septentrional. Sommaire de conférence, Association des universités canadiennes pour les études nordiques, 5ième Conférence Nationale des Étudiants en Études Nordiques, Burnaby, B.C., 28-30 novembre 1997.

RÉSUMÉ/DESCRIPTION :
La plupart des études actuellement disponibles au sujet des croûtes carbonatées que l'on retrouve en milieu arctique, concernent les dépôts de calcite accolés à la surface inférieure des cailloux et des blocs rocheux. Lors de leurs recherches sur les terrasses du lac Centrum situé dans le Nord-Est du Groënland, ont cependant fait la découverte de calcins en forme de choux-fleurs, localisés à l'intérieur des fissures de la roche mère et sous les cailloux. Ils décrivent ces dépôts comme étant des formes de précipitation de carbonate de calcium ayant l'aspect de colonnettes arborescentes à surface mamelonnée, et dont la morphologie est assez régulière d'un échantillon à l'autre. L'observation au microscope photonique de ces échantillons de calcins en lames minces leur ont permis de constater la présence de zones microlaminaires, qu'ils interprètent comme étant des alternances climatiques, vraisemblablement d'origine physico-chimiques et biologiques. Des dépôts cle calcite secondaire semblables aux calcrètes de fissures, ont aussi été découverts dans les fissures de la roche mère des massifs calcaires du Yukon septentrional. Nous proposons donc dans cet article, une brève étude sur la description des calcrètes de fissures, une classification de leurs micro-structures, ainsi qu'un aperçu des micro-restes que on a retrouvé à l'intérieure des croûtes lors de nos observations au microscope à balayage électronique.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Bear Cave, Yukon.

97-073 CLARKE, S.A. and LEWKOWICZ, A.G. (1997). The Influence of Climate Change on Solifluction: an Experimental Study. Program and Abstracts, 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
The objective of the experiment was to simulate various climate changes and directly examine the effects on solifluction rates. Natural solifluction rates have been measured using electro-mechanical meters over the past four years in the Hot Weather Creek valley. Five solifluction meters and thermocouple cables were installed close together on a planar portion of an 8' colluvial slope in 1992-93. The meters and thermocouple cables are multiplexed to a data-logger which began to acquire ground temperature and soil movement data continuously in August 1993. The natural variation of movements among the meters was

measured prior to climatic treatments being performed. During the summer of 1996, one meter was warmed using polyethylene sheeting, one wetted by manual watering of the slope, one treated to a combination of these treatments, one cooled by shading, and the last left as a control. Simultaneous measurements were made of active-layer piezometric pressures, soil moisture and active layer shear strength. Preliminary analyses indicate that the climatic treatments were successful in generating temperature and movement variations among the meters. →/← A complete examination of soil movement profiles will help to detail changes in active layer movement at the experimental site. Data retrieved during the summer of 1997 will be analyzed in order to determine the effect of the treatments on the autumn freeze-up period. Measurements will also be made to examine the possible presence of a lag effect through the summer of 1997 as a result of the previous year's treatments. By completing the analyses, it is hoped that relationships at the experimental site can be established between rates of movement, temperature and moisture. These relationships offer the potential for generalizations to be formulated concerning the influence of climate on solifluction rates and processes in a continuous permafrost zone. There is also potential for a greater understanding of the timing and type of movements which make up solifluction.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-074 DESCHAMPS, E.M. and LAURIOL, B. (1997). Biotic Remains in Caves of Northern Yukon, Canada. Conference Proceedings, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
Caves and rock shelters form natural traps in which large amounts of heterogeneous material are accumulated. Biotic remains often occupy an important part of this material and are considered important tools in paleoenviromental reconstruction. In this short paper, we make an inventory of some biotic remains collected from caves in northern Yukon.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Old Crow, Yukon

97-075 DUCHESNE, C. (1997). Influence du naled de la Rivière Firth sur les sols et la végétation, Yukon, Canada. These de Maîtrise, Département de géographie, Université d'Ottawa.

RÉSUMÉ/DESCRIPTION :
La rivière Firth est située dans la région non-englacée du nord du Yukon. L'objectif de

l'étude est d'observer si la glace de naled a un impact sur les sols et la végétation l'environnant. L'analyse des sols et l'observation de la végétation ont permis de déterminer qu'il y a une évolution différentielle le long de trois transept, un longitudinal et deux transversaux. L'étude et la datation d'un îlot au centre de la vallée a permis d'établir que la rivière s'est encaissée après 16084 /- 340 B.P. L'étude des sols au niveau de leur granulométrie donne une estimation du mode de déposition du matériel qui est, dans notre cas, majoritairement fluvial, mais où la glace peut jouer un rôle dans la dynamique de déposition. La concentration en sels des sols étudiés montre aussi une relation avec la distance de l'axe de la vallée. Elie est un indicateur de l'impact de la glace sur les sols et joue le rôle de signature. L'observation de la végétation se développant dans la vallée montre enfin l'influence de la glace: sa destruction implique sa présence alors que son développement indique son absence à plus ou moins court terme.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Old Crow, Yukon.

97-076 GRAY, J., CLARK, C., LAURIOL, B. and DECKER, V. (1997). A Critical Appraisal of the Noble Inlet Advance: an Alternative Scenario For Events in Eastern Hudson Strait Between 9000 and 8000 14C Yrs BP. Program and Abstracts 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
The present paper re-examines the concept, based on (1) striae, flutings and till sheet data from Akpatok Island in northern Ungava Bay; (2) striae and erratic provenance data at the southeastern extremity of the Meta Incognita Peninsula, and on the Lower Savage Islands; and (3) chronological conflicts between the Meta Incognita and Hudson Strait radiocarbon date record. Investigations led by the principal author on Akpatok Island have revealed evidence for converging lobes of ice, flowing easterly from northern Ungava and Hudson Strait, and northeasterly from SW Ungava or across Ungava Bay. Complex striae patterns reveal these flows, and also later radial outflow of ice from the island. Erratic evidence for NNE - NE flows of ice onto the island are restricted to a belt east of a large end moraine oriented N - S, and to the south of a zone composed almost entirely of locally derived carbonate till. The end moraine is associated with an ice advance in an easterly direction, and shows E - W oriented flutings indicative of overriding in the same direction, a flow pattern consistent with the deposition of an englacial curved moraine across the island, known as the "dark band". This last invasion from the west by continental ice probably occurred prior to 8600 14C yrs BP, as indicated by a date on two valves of *Portlandia arctica* in a 1-m thick locally derived diamicton at the NW tip of the island. No major glacial deposits of continental origin have been left on the island since./→

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Hudson Bay, Northern Québec

97-077 GRAY, J., CLARK, C., DECKER, V. and BLAIS, D. (1997). Patterns of Mountain and Continental Glaciation of the Northwest Torngat Mountains, Northern Québec-Labrador. Program and Abstracts 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
Along the western flank of the Torngat Mountains, fronting onto Ungava Bay, geomorphic evidence of ice flows obtained from striae pits, and from erratic provenance studies, reveal that during the last glaciation, a major lobe from the continental Laurentide ice sheet to the west impinged upon this uplifted mountain massif, but also that a local Torngat ice cap was significantly larger than previous researchers have envisaged. In the northernmost part of the peninsula, the continental ice clearly has overridden the summits, situated at circa 500 in elevation. Further south, in the Sheppard Lake - Eclipse Valley sector, evidence for the penetration of tongues of Laurentide ice into major low-lying valleys is found, which indicates that these must have been free of Torngat ice at this time. Lateral and terminal moraine complexes indicate at least one major late glacial stable phase during the retreat of the continental ice. Further south, in the vicinity of Abloviak Fjord, the limited striae and erratic evidence, indicates important outflow to the NW, of a Torngat Mountain ice cap. Very well developed glacial lake shorelines, and locally developed de Geer moraines, in coastal re-entrants provide irrefutable evidence, however, that local Torngat ice tongues had retreated up-valley to the glacial cirque zone prior to disintegration of the Laurentide ice sheet filling Ungava Bay, which occurred slightly before 8200 14C yrs BP, based on marine shell radiocarbon dates from a core in eastern Ungava Bay and a date on NE Akpatok Island. Extreme contrasts in sediment cover, and in weathering of bedrock at different altitudes in the Torngat Mountains were observed, as they have been previously by several researchers since the beginning of the century. Well preserved knife-edged cirques are also characteristic features of the high mountain zones, whereas subdued, worn down cirques characterise the lower plateaux edges. The hypothesis developed here is that these contrasts can be related to transitions from cold-based to warm-based thermal regimes at the base of local, thin and vigorously outflowing ice streams.

DISCIPLINE: Physical Geography

FIELDWORKLOCATION: Torngat Mountains, Ungava Bay, Northern Québec-Labrador

97-078 KOKELJ, S.V. and LEWKOWICZ, A.G. (1997). Effect of detachment sliding on surface wash erosion, Hot Weather Creek, Ellesmere Island, Nunavut. Presentation, 27th Arctic Workshop, Ottawa, Ontario, February-March 1997.

ABSTRACT/DESCRIPTION:
Rates of surface wash erosion were measured on detachment scars of varying age, and on undisturbed vegetated and non-vegetated slopes underlain by continuous permafrost in the valley of Hot Weather Creek. The aim was to examine to what extent the disturbance of vegetation cover and changes in hydrological conditions due to topographic modification by detachment sliding affect rates of surface wash erosion. Fieldwork was carried out in 1996 and the results presented here are preliminary. Nine study plots, ranging in size from 95 M2 to 15860 M2, were established at sites with varying vegetation covers. Plots were set up on (a) an undisturbed unvegetated slope, (b) two disturbed unvegetated slopes (1988 detachment slide scars), (c) two moderately vegetated slopes (pre-1950 detachment slide scars), (d) three well-vegetated slopes, and (e) a large section of a slope which included undisturbed areas as well as young and old detachment slide scars. Comparing the relationships between surface wash rates and vegetation cover on variously aged detachment slide scars (young - 1988, old pre - 1950) and on vegetated and unvegetated undisturbed slopes will provide a measure of the spatial variability of surface wash erosion. It also represents a framework within which to test the influence of detachment sliding and vegetation cover on rates of surface wash erosion./→

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-079 LACOURSE, T. and GAJEWSKI, K. (1997). Modern and Holocene Pollen Studies in the Kluane Lake Region of Southwest Yukon. Abstract, Canadian Quaternary Association, 8th Biennial Meeting, Montreal, Québec, May 22-25, 1997.

ABSTRACT/DESCRIPTION:
The Kluane Lake region occupies a large valley between the St. Elias Mountains to the west and the Ruby Ranges and Yukon Plateau to the east. The regional vegetation is presently open white spruce (*Picea glauca*) boreal forest with extensive poplar stands *(Populus balsamifera* and *P. tremuloides*) on warmer sites, and *Artemisia*-dominated grasslands on dry south facing slopes. Willows (*Salix spp.)* and dwarf birch (*Betula glandulosa*) are common in the region. From just to the north of Kluane Lake to the Yukon/British Columbia border, a transect of 15 lakes were sampled for surface sediments and water chemistry. Chemical analyses demonstrate that the majority of sites are characterized by Mg or Ca-rich bicarbonate waters, with low nutrient (0 to 1.66 ug/L TPU) and chlorophyll (0. 1 to 0.72) levels. Surface sediment samples are dominated by *Picea glauca* pollen. *Betula*, *Alnus* and *Salix* are also important components. *Alnus*, present only as scattered shrubs in the Kluane Lake region, is clearly over represented. Small yet significant amounts of *Populus* and *Artemisia* pollen are found at sites to the east of Kluane Lake where poplar groves and *Artemisia*-dominated grasslands are abundant. A 4.62 in sediment core was extracted from Sulphur Lake (60.95 'N, 137.95 'W; 847 in) using a modified Livingstone piston corer.

Whole core X-radiography and magnetic susceptibility measurements served as non-destructive methods of correlating core sequences and revealed considerable variation in sediment deposition. The deposition of volcanic ash and the variation in loess accumulation can be identified in fluctuations of magnetic susceptibility.

DISCIPLINE: Botany

FIELDWORK LOCATION: Kluane Lake, Yukon

97-080 LACOURSE, T., GAJEWSKI, K. and JOHNSON, P.G. (1997). Paleoenvironmental Studies in the Kluane Lake Region, Southwestern Yukon. Program and Abstracts 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
The Kluane Lake region of the southwestern Yukon provides many opportunities for paleoenvironmental research. Evidence of Holocene climate changes are available from records of glacial fluctuations. Paleoclimatic studies based on the analysis of microfossils in lake sediments offer the potential for high resolution and well-dated independent records of past climates. The vegetation of the area is an open white spruce (*Picea glauca)* boreal forest with *Artemisia*-dominated grasslands on drier slopes. Extensive stands of poplar (*Populus*) are also present. Black spruce (*P. mariana*) is uncommon, occurring on some wet sites. Alder (*Alnus)* is sparsely distributed in the Kluane Lake region but nevertheless alder contributes significantly to the pollen rain. These sites present potential analogues for some late-glacial pollen assemblages. For calibration studies', a transect of lakes from just to the north of Kluane Lake to the Yukon/British Columbia provincial border were sampled for surface sediments and water chemistry. These sites include a wide variety of environments, and many influences affect water quality and vegetation distribution. The input of loess from the Slims and Donjek Rivers affect some of these sites. The sites are all basic, while surface conductivity varies from 115 to 6 10 us/cm. A volcanic ash dated at 1147 BP covered the region to varying degrees, and serves as a stratigraphic marker, the presence of which aids in dating and correlating lake sediment cores from the region. A core recovered from Sulphur Lake (60.95'N; 137.95'W, 847 m) contains a 4.62 m sequence of relatively organic sediment which can potentially provide a high resolution pollen sequence.

DISCIPLINE: Botany

FIELDWORK LOCATION: Kluane Lake, Yukon

97-081 LAURIOL, B. et al (1997). Caves as Sources of Biotic Remains in Northern Yukon, Canada. Program and Abstracts, 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
Sinkholes, rock shelters, and caves have long been known and studied as repositories of valuable information pertaining to past environments. Frequently functioning as sediment traps, they can accumulate throughout their geologic life large and complex samples of clastic, chemical and organic mobile debris that are derived from the natural environment. Often used as shelters by a variety of animals, including predators and scavengers, they will also contain the remains of these animals and/or their diet. Through the combination of such contributing factors, cave sedimentation can lead to the formation of some of the richest, most varied, and best preserved deposits found in continental environments. Such is the case, for example, with the Northern Yukon Interior Bluefish Caves, which, in addition to containing archaeological evidence suggesting a Full-to-Late Glacial human occupation of this region, have yielded the largest and best preserved *in situ* fauna known in the whole of Eastern Beringia. In this poster, we introduce several other caves that were discovered over the last two decades in the Northern Yukon Interior, in an extensive karst region located along the southern rim of the Porcupine Basin. They all contain a broad range of abundant organic remains.

DISCIPLINE: Biology

FIELDWORK LOCATION: Yukon

97-082 LEBLANC, P. et JOHNSON, P.G. (1997). Les fluctuations du niveau des eaux du Lac Kluane au sud-ouest du Yukon. Presentation, 27ième Arctic Workshop, Université d'Ottawa, février-mars 1997.

RÉSUMÉ/DESCRIPTION :
L'existence de plages soulevées situées au dessus du niveau actuel des eaux du lac Kluane ainsi que celle de forêts inondées témoigne des fluctuations du niveau du lac au cours de l'Holocène. Une datation radiocarbone effectuée sur une souche d'arbre inondée nous a donné un âge de 420 ± 60 ans ce qui indique donc d'une élévation récente du niveau du lac. Les lacs Fox Point et Rat étant situés immédiatement en bordure du lac Kluane, le niveau de leurs eaux se trouve contrôlé par le niveau hydrostatique de la nappe phréatique qui est lui-même contrôlé par celui du lac Kluane. L'analyse des séquences sédimentaires de ces deux lacs devrait donc nous permettre de reconstruire l'histoire hydrologique du lac Kluane. Ces deux lacs, avec des profondeurs d'environ 9 a 10 mètres dans les sections les plus profondes, auraient été asséchés durant les épisodes de bas niveaux (i.e. inférieurs a 10 mètres sous le niveau actuel) et, à l'inverse, auraient été inondés pendant les phases de hauts niveaux associés aux plages soulevées. Les altitudes des points les moins élevés séparant ces lacs du lac Kluane étant connus, les phases inondées pourront également être situées dans la chronologie des fluctuations du niveau du lac Kluane. L'analyse des séquences sédimentaires de ces lacs semblent indiquer des variations importantes dans la nature et la composition du sédiment. Des mesures de susceptibilité magnétique, des radiographies et une description

détaillée des carottes nous ont permis de vérifier la continuité des séquences stratigraphiques et de faire les premières observations. Les analyses granulométriques, la détermination du pourcentage de matière organique et de carbonate, l'identification des minéraux et des macro-restes ainsi que les analyses isotopiques serviront a reconstruire les conditions paléo-environnementales de ces deux bassins. Grâce à l'information qui sera ainsi obtenue, l'hypothèse de Bostock (1969) sur les fluctuations de niveaux et le renversement du sens d'écoulement du lac Kluane pourra être vérifiée. De plus, d'autres théories pourront être élaborées sur l'histoire des conditions environnementales et hydrologiques néoglaciaires de cette région.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Old Crow, Yukon

97-083 MARTELOCK, H. (1997). The Inuit Artist: A Creative Eclectic Force. Conference Proceedings, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
The perception used here is that of the fine artist, and is focussed on the structures of architecture and material expressions of Christian Churches in the contemporary Inuit communities of Baffin island and N.W.T. It explores the influence of the Christian mythology within the Inuit artistic creations. The focus of my research is the interior, exterior, and the contexts of the Roman Catholic and Anglican churches on Baffin Island and the Melville Peninsula. The contemporary Inuits' relationship with Christian religion is being examined with photography and interviews. As an artist I research from the perspective of the artist. This research is seeking an understanding and recognition of the place of the contemporary Christian Inuit artist. The Inuit come out of a culture based on survival and oneness with the natural forces. After studying the adaptability and practicality of the Inuit old ways the question arises: is the Christian Inuit artist the cohesive link between these two cultural belief systems: the traditional and the Christian ways of life?

DISCIPLINE: Sociology

FIELDWORK LOCATION: Baffin Island, Nunavut

97-084 ROCHELEAU, M. (1997). Sédimentologie des paléoplages de la Plaine d'Old Crow, Territoire du Yukon, Canada. Thèse de Maîtrise, Rapport d'études, Département de géographie, Université d'Ottawa.

RÉSUMÉ/DESCRIPTION :

Par cet étude nous tentons de vérifier l'hypothèse suivante- l'étude des caractéristiques des sédiments des paléoplages permet de déterminer la fréquence des épisodes glacio-lacustres dans la plaine d'Old Crow. De plus, nous voulons répondre aux deux objectifs principaux, connaître l'environnement dans lequel les lacs se sont mis en place et les événements qui ont conduit à leur drainage. Les analyses calcimétriques et pétrographiques ont permis de constater que le matériel des paléoplages est en général d'origine locale. Les analyses morphoscopiques des sédiments fins et des galets corroborent ces dernières en concluant que le matériel se caractérise par un aspect mat et une forme subanguleuse, caractéristique d'un matériel qui a subi un transport peu important et peu d'exposition aux agents d'érosion. Les différences entre les niveaux de plages et selon la position longitudinale le long d'une même crête amènent à spéculer sur les conditions d'édification de chaque niveau de plage. En général, nous pouvons constater que l'environnement du paléolac offrait une dynamique plutôt moyenne puisque les sables et graviers y sont, en général, peu émoussés. La chronologie relative de la région du nord du Yukon a également été construite. Il y aurait eu au moins deux inondations dans la plaine d'Old Crow, avec possibilité d'une troisième, intercalées par une période creuse où l'alimentation en eau de fonte était réduite et où on dénote des activités de mouvement de pente.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Old Crow, Yukon.

97-085 **SAWADA, M. and JOHNSON, P.G. (1997).** Hysteresis in the relation between suspended sediment concentration and discharge, Slims River, Yukon Territory, Canada 1994. Presentation, 27th Arctic Workshop, Ottawa, Ontario, February-March 1997.

ABSTRACT/DESCRIPTION:

Hysteresis between suspended sediment concentration and discharge is common in many glacial and proglacial streams during diurnal discharge and in non-glacial streams during stormflow. There have been a number of explanations that address this phenomena, however, none of these explanations sufficiently explains the frequency of hysteresis observed in the Slims River at its input to Kluane Lake. Clockwise hysteresis, the most common type, occurs when suspended sediment concentrations (SSC) are higher on the rising limb of the hydrograph for equal discharges on the falling limb. A qualitative model of the causes underlying hysteresis has been derived.→/← The applicability of this model means that its effects should be observable within the diurnal SSC and discharge (Q) time series: Greater rates of change of Q on the rising limb should equal smaller flow volumes on the rising limb. Smaller volumes on the rising limb exhaust internal supply compartments causing greater SSCs. The flow volume ratio (volume rising: volume falling) should be inversely proportional to the concentration ratio (SSC rising : SSC falling) because of dilution effects. The relative change in maximum SSCs on successive hydrographs should be positively correlated with the rise in stage over the previous day since a greater rise in stage tap internal

sediment supplies.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Slims River, Yukon

97-086 CORCORAN, P.L., MUELLER, W.U. and CHOWN, E.H. (1997). Climatic and tectonic influences on fan deltas and wave- to tide-controlled shoreface deposits: evidence from the Archean Keskarrah Formation, Slave Province, Canada. Research Report, Department of Earth Sciences, Université du Québec à Chicoutimi.

ABSTRACT/DESCRIPTION:
The Archean Keskarrah Formation, located in the central Slave Province, Northwest Territories, Canada, is a late-orogenic, tectonically-controlled sedimentary sequence that developed under unusual climatic and depositional conditions. The formation is adjacent to the crustal-scale, north trending Beniah Lake Fault and overlies the 3.15 Ga Augustus Granite, the 2.69-2.7 Ga mafic volcanic Peltier Formation and the turbiditic Contwoyto Formation unconformably. Principal lithofacies in the Keskarrah Formation include conglomerate, sandstone and siltstone-sandstone. The conglomerate lithofacies represents coalescing gravelly streamflow-dominated fan deltas adjacent to topographic highs. →/← Abundant conglomerate with up to 4 m-large granitic boulders derived from the adjacent Augustus Granite and mafic clasts from the Peltier Formation indicate high relief and fault related uplift and subsidence. The intimate association of fan deltas and wave- and tide-influenced shallow marine deposits in association with quartz-rich sandstones forming in a high relief area make the Keskarrah Formation remarkable in the rock record.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Archean Keskarrah Formation, N.W.T.

97-087 CORCORAN, P.L. and MUELLER, W.U. (1997). The Archean Keskarrah Formation, Point Lake, Slave Province, N.W.T.: alluvial to shallow-water coarse clastic sedimentation. Paper, Geological Association of Canada/Mineral Association of Canada Annual Meeting, Ottawa, Ontario, May 19-21, 1997.

ABSTRACT/DESCRIPTION:
The late Archean Keskarrah Formation is a coarse clastic sedimentary assemblage that represents shallow marine and alluvial deposition in an fault-controlled setting. The sedimentary sequence unconformably overlies the 3.15Ga Augustus granite, the 2.69-2.7Ga mafic volcanic Peltier Formation and the turbiditic Contwoyto Formation and is composed of: (1) a conglomerate unit, (2) a sandstone unit, and (3) a siltstone-sandstone unit. →/← The major north-trending Beniah Fault may have had significant influence on the unroofing of the basement rocks and the stratigraphic evolution of the Keskarrah Formation. Late-orogenic basins such as this one are common in Archean supracrustal sequences and represent the terminal stages of Archean cratonization.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Archean Keskarrah Formation, N.W.T.

97-088 **LAVOIE, D. (1997).** Design et culture matérielle : Expérience de création en design à l'école Innalik, Inukjuak, mai 1997. Présentation, Association des universités canadiennes pour les études nordiques, 5ième Conférence nationale des étudiants en études nordiques, Burnaby, B.C., 28-30 novembre 1997.

RÉSUMÉ/DESCRIPTION :
Ce séjour avait pour principal objectif de poursuivre les apprentissages en regard à une approche pédagogique en design d'objets, appuyée d'un outil informatique conçu par le groupe de recherche. Deux des trois séjours réalisés à Inukjuak (octobre 1996 et mai 1997) furent consacrés à des ateliers de création en design réalisés en collaboration avec Madame Raymonde Haché, professeur de la classe de cinquième française à l'école Innalik.

DISCIPLINE : Communications

LIEU DU TRAVAIL SUR LE TERRAIN : Inukjuak, Nord du Québec

97-089 **DUCHEMIN, E., LUCOTTE, M. and CANUEL, R. (1997).** Source of Organic Matter Producing Greenhouse Gases Emissions from Hydroelectric Complexes of the Boreal Region. Paper, 3rd International Conference on Reservoir Limnology and Water Quality, Ceské Budejovice, Czech Republic, August 11-15, 1997.

ABSTRACT/DESCRIPTION:
The creation of extensive hydroelectric reservoirs in boreal regions may play an important role in the C cycle, not simply in inhibiting the natural sinks but, more importantly, in liberating greenhouse gases (C02, CH4) in response to the degradation of organic matter stored in the boreal soils. This hypothesis is presently at the heart of current debates concerning methods of energy production. Following an evaluation of the atmospheric fluxes of C02 and CH4 from three hydroelectric reservoirs in the boreal region, flooded since 1926, 1978 and 1993, we found that despite significant spatio-temporal variation in the water-air emission fluxes the overall emissions were much lower than those of conventional thermal energy producers. The atmospheric emission fluxes of C02 and CH4, as measured during the three years of study were 1200 MgC02 m 2 d-1 1 (±800, n=296) and 8.0 mgCH4 M-2 d- 1 (±5.2, n=404). Furthermore, employing these data, a hydroelectric company estimated that even the cleanest fossil fuel option (natural gas) could account for emissions 18 times greater than those of hydroelectric reservoirs; the basis of their calculation being the assumption that after 50 years the fluxes would fall to zero. We, however, observed no statistical difference between emission fluxes from reservoirs of 1,2,3,4,15,16 and 69 years old. For that assumption they only considered the degradation of organic matter contained in flooded soils. They did not take into account the contribution of allochtonous carbon and fixation of carbon by primary production to the carbon budget of hydroelectric reservoirs. The goal of the present investigation was to identify the different sources of degrading organic matter producing C02 and CH4, and quantify the importance of each source in the carbon budget of hydroelectric reservoirs in the boreal region.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: La Grande 2, La Forge 1, Northern Québec

97-090 **DUCHEMIN, E., LUCOTTE, M. and CANUEL, R. (1997).** "Comparison of Static Chamber and Thin Boundary Layer Equation Methods for Measuring Greenhouse Gas Emissions from Large Water Bodies". Environmental Science and Technology, 33:350-357

ABSTRACT/DESCRIPTION:
The emission fluxes of CH4 and C02 at the water-air interface of two large reservoirs were evaluated using two methods: (1) static chambers (STAT) and (2) the boundary layer

equation (BLE). Such a comparison was rendered necessary in order to verify the information yielded by various automated measurement devices recently developed and based on BLE flux measurement principles. Our study shows that the BLE method underestimates the actual fluxes of C02 and CH4. The variation observed between the two measurement techniques may be explained by different errors or biases inherent in the methods and therefore not a reflection of the true emissions. Variability observed in both data sets impose cautiousness on any drastic conclusion about this comparison, but it appears that the BLE method underestimates the C02 and CH4 emission fluxes from large water bodies. Additionally, compared to the STAT technique, the BLE method overestimates the wind effect in deep areas. For shallow zones, however, the use of the BLE underestimates emissions when winds are light. Our data set supportthat gas exchange across the airwater interface is largely independent of low wind speeds. Finally, our results suggest that the thin boundary layer equation, which enables high resolution observations by means of automated devices, cannot be used, without considerable caution, for estimating global greenhouse budgets from large water bodies.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: La Grande 2, La Forge 1, Northern Québec

97-091 **BROWN, K.M., ZEEB, B.A., SMOL, J.P. and PIENITZ, R. (1997).** "Taxonomic and ecological characterization of chrysophyte stomatocysts from northwestern Canada". Canadian Journal of Botany, 75:842-863

ABSTRACT/DESCRIPTION:
Chrysophyte stomatocysts from the surface sediments of 49 lakes located on a north -south transect in the Yukon and Northwest Territories, Canada, were investigated for their potential use as indicators of environmental change in northern latitudes. Photographic plates and descriptions, following International Statospore Working Group guidelines, illustrate 19 new stomatocyst morphotypes. The main patterns of floristic variation in the data set were explored using canonical correspondence analysis, which indicated that gradients of chloride ($r2 = 0.73$), dissolved inorganic carbon ($r2 = 0.63$), and surface-water temperature ($r2 = 0.55$) were important in influencing species assemblages. Compared with the diatom-temperature inference model developed from the same set of lakes, the stomatocysts provided a slightly less robust model. These results suggest that stomatocysts are weakly, though significantly, related to some of the gradients in lake water chemistry in this data set and can provide a complement to other paleoccological markers.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Yukon and Northwest Territories

97-092 **GREGORY-EAVES, I. and SMOL, J.P. (1997).** Diatom Communities from Alaska as Proxies for Inferring Past Climate Change. Conference Abstracts, Canadian Society Limnologists, Ottawa, Ontario, January 2-4, 1997.

ABSTRACT/DESCRIPTION:
Alaskan paleoclimatic studies are of particular interest because this landscape contains one of the few high latitude regions of North America that was unglaciated during the Pleistocene. Reconstructions of past climate changes, such as the Pleistocene-Holocene transition, are of considerable importance for global change studies, as these events may provide analogues for future global warming. Diatoms, preserved in lake sediments, are effective proxies of climate dynamics because their short generation times allow for a rapid response to environmental changes. Relating modem diatom communities to their environment through multivariate statistics can allow for the development of quantitative reconstructions of climate variables. The modem diatom communities of fifty-one lakes distributed along a north-south transect of Alaska spanning the ecotone boundary between the boreal forest and tundra will be used to develop diatom-based transfer functions of significant climatic and other environmental variables. This study is in progress and the

results from a subset of lakes will be presented. The resulting transfer functions will then be applied to a 5 in sediment core to infer the climatic conditions of the Pleistocene Holocene Transition in Alaska.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Alaska

97-093 GREGORY-EAVES, I. and SMOL, J.P. (1997). Diatoms as Indicators of Paleoclimatic Shifts from an Alaskan Late Wisconsin Record. Conference Abstracts, Canadian Society Limnologists, Ottawa, Ontario, January 2-4, 1997.

ABSTRACT/DESCRIPTION:

Understanding environmental dynamics during past episodes of abrupt climate change, particularly in the more sensitive high latitude environments, is critical for building predictions of future global warming. Paleolimnological investigations using diatoms (Class *Bacillariophyceae*) have proven to be effective at reconstructing climatically related environmental shifts. Inferences of paleoenvironmental and climatic shifts from the central interior of Alaska during the Late Wisconsin-Holocene transition are drawn from a reconstruction of a sediment core of Birch Lake. Three distinct zones are visible in the diatom stratigraphy, possibly corresponding to climatically-related environmental shifts. The basal zone is dominated by benthic alkaliphilous taxa which are commonly seen in lakes with extensive ice cover. From approximately 9.2 ka to 8.5 ka there are very few diatoms preserved in the sediment. During this period, significant changes are evident in the isotopic and sedimentary composition of the core. All of these proxies suggest that a pronounced change in environmental conditions occurred. Following this zone, the diatom community is dominated by planktonic species, which suggest higher water levels and a less extensive ice cover. Using a diatom-based transfer function (currently in development), the changes in community composition from the Birch Lake core will be used to quantitatively reconstruct a climatically-related environmental variable. The transfer function will be constructed from the modem diatom communities of 51 lakes distributed across a north south gradient in Alaska. In this poster, we will also present a correspondence analysis of the Birch Lake fossil samples and a subset of calibration set samples to allow for further interpretations of the paleoenvironmental history of Birch Lake to be drawn.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Alaska

97-094 GREGORY-EAVES, I. and SMOL, J.P. (1997). Diatoms as indicators of paleoclimatic shifts from an Alaskan Late Wisconsin Record. Abstract, 11th Northwest Aigal

Symposium, Victoria, B.C., May 9-11, 1997.

ABSTRACT/DESCRIPTION:
Knowledge of the rate and magnitude of past climate change is critical for understanding the impacts of global warming. Because long term temperature record are sparse, paleolimnological techniques using diatoms (Class *Bacillariophyceae*) have been particularly useful for reconstructing climate. This project has been designed to quantitatively reconstruct the environmental dynamics of Birch Lake during a period abrupt climate change, the Late Wisconsin. Preliminary analysis of the Birch Lake diatom stratigraphy demonstrate three distinct zones of paleoenvironmental and climatic shifts. Using a diatom-based transfer function (currently in development), the changes in community composition from the Birch Lake sediment core will be used to quantitatively reconstruct a climatically-related environmental variable. The transfer function will be defined from a calibration set of 51 lakes distributed across a north-south transect in Alaska.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Alaska

97-095 **HAY, M., SMOL, J.P., PIPKE, K.J. and LESACK, L.F.W. (1997).** "A Diatom-based Paleohydrological Model for the MacKenzie Delta, Northwest Territories, Canada". Arctic and Alpine Research, 29(4):430-444.

ABSTRACT/DESCRIPTION:
Flood plain lakes are tightly coupled to their associated river systems and their sediment records should provide integrative records of this interaction. Surface sediments and selected limnological variables were collected from 77 Mackenzie Delta lakes representing three categories of river influence: lakes having continuous connection with the Mackenzie River (n = 23; no-closure), lakes that flood every spring but lose connection during the summer (n = 26; low-closure), and lakes that flood only during an extreme spring flood stage (n = 28; high-closure). Summer lake production, using winter methane concentration as a proxy, and river influence were identified as the principal limnological gradients separating delta lakes. This river influence/primary production gradient also accounted for the greatest amount of variation within the surface sediment diatom assemblages. The diatom flora of the Mackenzie Delta lakes was dominated by benthic taxa, particularly the genera Nitzschia and Navicula, with a greater abundance of stalked, epiphytic taxa in the high-closure lakes. A robust predictive model was developed for inferring lake production from fossil diatom assemblages. The model provides a tool for estimating long-term changes in river influence and lake dynamics from the sediment record of Mackenzie Delta lakes. Diatom-inferred river influence changes within these records may then be linked with past river discharge variability.

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Delta, N.W.T.

97-096 KIDD, M.G. (1997). Geographic Variation in a Northern Seabird (*Alcidae:Dephus*): Patterns and Process. M.Sc. Thesis, Faculty of Graduate Studies, Queen's University.

ABSTRACT/DESCRIPTION:
The distribution and evolution of geographic variation is of fundamental interest to the origin of species, and molecular genetic tools provide high resolution means to examine such variation in natural populations. I determined the complete sequence of control regions of five subspecies of black guillemots (*Cepphus grylle*), two subspecies of pigeon guillemots (*C. columba*) and spectacled guillemots (*C. carbo*), and described molecular variation and phylogenetic relationships therein. In doing so, I discovered a previously undescribed nuclear homolog of the control region. Nuclear sequences were found in all individuals, were 61 percent divergent from mitochondrial sequences, and formed a distinct phylogenetic clade, therefore the mitochondrial-nuclear introgression event must predate the radiation of *Cepphus*. As in other species, the guillemot control region had a relatively conserved central block preceded by a hyper variable 5' end. All individuals were heteroplasmic for a number of simple tandem nucleotide repeats (A(n)C) at the 3' end of the control region. Phylogenetic and biogeographic analyses suggested black guillemots (*C. grylle*) are basal to pigeon (*C. columba*) and spectacled (*C. carbo*) guillemots, but evolutionary relationships among subspecies remained unresolved due to incomplete lineage sorting. Population level variation in the mitochondrial control region indicated very little sharing of genotypes among populations. Estimates of time to shared ancestry suggest variation within populations has likely evolved since the onset of the recent interglacial - 16 000 years ago, which may explain unresolved phylogenetic relationships among subspecies; variation among subspecies of black guillemots suggests populations may have been isolated during the last glacial event of the Pleistocene Epoch. Analysis of molecular variance, regression analysis and Mantel's test suggest populations are isolated genetically. These results suggest subspecific diversity in guillemots has been shaped by vicariance events of the Pleistocene, and are consistent with earlier hypotheses about the evolution of *Cepphus*.

DISCIPLINE: Biology

FIELDWORK LOCATION: Svalbard and Sud Fugloya, Norway

97-097 LAING, T.E. and SMOL, J.P. (1997). A Comparison of Treeline Lakes in Siberia: Water Chemistry and Diatom Assemblages. Conference Abstracts, Canadian Society Limnologists, Ottawa, Ontario, January 2-4, 1997.

ABSTRACT/DESCRIPTION:
Knowledge of circumpolar treeline ecosystems is important in light of the predicted high temperature changes under global warming for these regions. However, little data exist for much of the circumpolar treeline, especially northern Asia. In this study, we investigated the relationship between water chemistry and surficial sediment diatom assemblages for transects of lakes crossing treeline in three different regions of Siberia. Principle Components Analysis (PCA) was used to determine groupings of lakes with similar water chemistry in each region. Forested lakes were generally associated with higher dissolved nutrient concentrations in comparison with the tundra lakes. Canonical Correspondence Analysis (CCA) was used to identify variables explaining a significant amount of variation in the diatom distributions. Both climatic variables (e.g. dissolved organic carbon, temperature) and variables related to anthropogenic disturbances were important in explaining the diatom distributions in the various regions. Combination of the three calibration sets indicated that diatom assemblages in each region were distinct from each other, reflecting the marked differences in local geology and other measured factors.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Siberia, Russia

97-098 LAING, T.E. and SMOL, J.P. (1997). Diatoms as Climatic Change Indicators from three Treeline Regions in Northern Siberia: Comparisons and a Case Study. Abstract, 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
Global warming is expected to have enhanced effects on high latitude regions. In light of these predict ions, knowledge of the effects of climatic change on circumpolar treeline ecosystems is important. However, little such data exist for large portions of the circumpolar treeline, especially northern Siberia. In order to provide some of these data, the Palaeoecological Analysis of Circumpolar Treeline project (PACT) was formed. PACT is a multi-proxy study focussing on Holocene climatic change in treeline regions. This present research is a component of the PACT project addressing the aquatic response to climatic change at treeline. Diatom assemblages are commonly used as environmental indicators in paleolimnological studies as they respond to climatic change both directly in response to temperature changes, and indirectly in response to vegetation-linked factors, such as dissolved organic carbon (DOC). Here, we investigate the potential to use diatoms as climatic indicators in Siberia, and develop paleoclimatic scenarios based on changes in diatom assemblages. The objectives of this study were twofold: first, to compare the modern relationships between measured environmental variables and diatom assemblages in three surface sediment calibration sets of lakes spanning treeline in Siberia; and second, to examine diatom assemblages preserved in a sediment core showing evidence of a shift in treeline position. In the first part of our study, we investigated the relationship between

measured water chemistry variables and observed diatom assemblages in three regions of Siberia. Canonical Variate Analysis (CVA) was used to determine variables separating groups of lakes classified by vegetation zone. Water chemistry differed significantly between lake groups for all three regions, with forested lakes generally associated with higher water temperatures, conductivities, and depths.→ /← In the second part of our study, we examined diatom assemblages preserved in a core from the Norilsk region showing evidence of a treeline shift. In summary, diatom assemblages in the three regions of Siberia reflect climatic gradients across treeline, such as temperature and DOC, as well as geological factors.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Siberia, Russia

97-099 PIENITZ, R., SMOL, J.P. and LEAN, D.R.S. (1997). "Physical and chemical limnology of 24 lakes located between Yellowknife and Contwoyto Lake, Northwest Territories (Canada)". Canadian Journal of Fisheries and Aquatic Sciences, 54 (2):347-358.

ABSTRACT/DESCRIPTION:
Data on the water chemistry and limnology of 24 lakes located between Yellowknife (62 27^0N, 114 21^0 W) and Contwoyto Lake in the central Northwest Territories were examined using principal components analysis and other statistical techniques. The study sites were mostly shallow (Zmax = 2.5-25 m: mean = 8.2 m), nutrient-poor (3.412.7 ug total phosphorus/L; mean = 6.6 ug - L-1), low-alkalinity lakes. Water was typically low in solutes (specific conductance near 0-100 us - cm-1), with slightly acidic to alkaline pH (6.2-8.9). Levels of all nutrients and major ions showed identical trends of decreasing concentrations with increasing latitude with the highest concentrations generally in lakes with conifer forested catchments in the south.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Yellowknife, N.W.T.

97-100 PIENITZ, R., SMOL, J.P. and LEAN, D.R.S. (1997). "Physical and chemical limnology of 59 lakes located between the southern Yukon and the Tuktoyaktuk Peninsula, Northwest Territories (Canada)". Canadian Journal of Fisheries and Aquatic Sciences, 54 (2):330-346.

ABSTRACT/DESCRIPTION:
Water chemistry and other limnological data gathered for 59 lakes in the Yukon and the adjacent Northwest Territories (Canada) were interpreted using linear regression and principal components analysis. The study sites represent lakes from a wide range of

ecoclimatic regions, spanning large latitudinal (60°37'-69°35'N) and altitudinal gradients (15-1387 m above sea level). Water samples collected from each lake were analysed for concentrations of major ions, trace metals, nutrients and chlorophyll a. Most of the lakes were dilute (mean conductivity = 160 us - cm-1) and slightly acidic to alkaline (pH range = 5.9-9.3). Their ionic composition varied from Ca-CI-Na waters near the Arctic Ocean to Ca-HC03 waters further inland, reflecting differences in local drainage basins and proximity to the sea. Arctic and alpine sites generally showed many similarities, but considerable differences in water chemistry were observed among sites in the interior of the Yukon Territory. These can be related mainly to differences in bedrock geology and catchment vegetation.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Yellowknife, N.W.T.

97-101 PISARIC, M. et al (1997). Response of Aquatic and Terrestrial Systems to past Climatic Change at Treeline in North-central Siberia Abstract, 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
The accumulation of $C0^2$ and other greenhouse gases in the atmosphere are projected to have substantial impacts on the global climate system. In concert with these changes, scientists are also projecting major changes in the position and the composition of present day vegetation ecotones. Recent reports suggest that temperature increases in high latitudes will be 50-100 percent greater than the global mean. Such temperature variations will likely have significant impacts on northern vegetation and could result in profound feedbacks to the global climate system. In northern Canada, it is estimated that the boreal forest may shift several hundred kilometres north of the present day location as a result of global warming. Given that circumpolar treeline is sensitive to changes in climate, especially fluctuations in temperature, this geographical boundary could serve as an important indicator of climate change. Although a large volume of work has discussed treeline changes in northern Canada, very few studies have assessed how this ecotone has changed in northern regions of Siberia. We present here changes in the relative abundances of fossil pollen, stomates and diatoms (class *Bacillariophyceae*) from a 365 cm lake sediment core from the tundra region of the lower Lena River, Siberia. The results from this study are part of the PACT (Paleoecological Assessment of Circumpolar Treeline) project, a multi disciplinary, collaborative effort between Canadian, Russian and American scientists. /→

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Siberia, Russia

97-102 TAYLOR, S. (1997). Taxonomy and Ecological Characterization of Chrysophycean Arctic Tundra, Canada. M.Sc. Thesis, Faculty of Graduate Studies, Queen's University.

ABSTRACT/DESCRIPTION:
Chrysophycean stomatocysts were sampled from surface sediments of lakes from two areas in northwestern Canada in order to broaden our knowledge of chrysophyte distributions in high northern latitudes. The first set of lakes spans a transect across treeline, northeast of Yellowknife, N.W.T. The second set of lakes is located in the boreal forest of Wood Buffalo National Park (WBNP), Alberta and N.W.T. The majority of stomatocysts from these lakes had been previously described; however, descriptions and photographs are included for 33 new morphotypes, following International Statospore Working Group guidelines. The two lake sets were analysed separately using ordination and regression statistics to examine the relationships between cyst morphotypes and environmental data. For the lakes near Yellowknife, it was determined using a redundancy analysis with forward selection that Ca (calcium), TPu (total unfiltered phosphorus) and DOC (dissolved organic carbon) explained significant proportions of the variance in cyst assemblages. Partial least squares (PLS) regression and calibration techniques were used to model the most important variables. The strongest models were developed for Ca (jack knifed r2=0.73; RMSEP=0.15) and DOC (jack knifed r2=0.52; RMSEP=0.30).

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: N.W.T.

97-103 WILKINSON, A.N., ZEEB, B.A., SMOL, J.P. and DOUGLAS, M.S.V. (1997). "Chrysophyte Stomatocyst Assemblages Associated with Periphytic, High Arctic Pond Environments". Nordic Journal of Botany, 17:95-112.

ABSTRACT/DESCRIPTION:
Chrysophycean stomatocysts associated with three different periphytic substrates (wet mosses, submerged mosses and rock scrapes) were investigated from ponds on Cape Herschel, Ellesmere Island in the Canadian High Arctic. The goal of this study was to determine whether a distinct assemblage of periphytic chrysophyte cysts existed and, if so, whether assemblage composition varied with substrate and between ponds. One hundred and thirty-seven different cyst morphotypes were observed with light microscopy from 68 periphytic samples taken from 35 ponds. Twenty-six of these cysts were new morphotypes, of which 16 were identified and described using scanning electron microscopy. Significantly more cyst types with collars and hooked projections in the collar region (i.e. 'hooked'), and fewer unornamented morphotypes were recorded in the periphytic habitats as compared to the surface sediments. Wet moss stomatocyst assemblages were particularly distinct, with a high number of heavily silicified and hooked morphotypes. The morphotype richness was far greater in periphytic environments, with 86, 100 and 95 morphotypes observed in the wet

mosses, submerged mosses and rock scrapes, respectively, as compared to only 35 types in the surface sediments of the ponds. Canonical correspondence analysis indicated that measured water chemistry did not account for the variation in the species data.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Ellesmere Island, Nunavut

97-104 ATKINSON, S.N., CATTET, M.R.L. POLISCHUK, S.C. and RAMSAY, M.A. (1997). "A Case of Offspring Adoption in Free-Ranging Polar Bears (*Ursus maritimus*)". Arctic, 49 (1):94-96.

ABSTRACT/DESCRIPTION:
During a study of the reproductive ecology of polar bears (*Ursus maritimus*) in western Hudson Bay (Canada), we documented a case of litter adoption. In an eight-month period, a ten-year-old adult female lost a litter of two cubs-of-the-year and adopted three other cubs-of-the-year. This is the first reported case of natural offspring adoption in polar bears, and its significance as a reproductive strategy is unknown. Nevertheless, the observation raises questions regarding the social circumstances under which adoption may occur and the benefits or costs to maternal fitness in a solitary mammal such as the polar bear.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Hudson Bay, Northern Manitoba

97-105 CATTET, M.R.L., CAULKETT, N.A., POLISCHUK, S.C. and RAMSAY, M.A. (1997). "Reversible Immobilization of Free-ranging Polar Bears with Medetomidine-Zolazepam-Tiletamine and Atipamezole". Journal of Wildlife Diseases, 33(3):611-617.

ABSTRACT/DESCRIPTION:
The objective of this study was to determine if the potent x2 agonist, medetomidine, and its specific antagonist, atipamezole, could be effectively used to immobilize polar bears (*Ursus maritimus*). Specifically, our goal was to develop a drug combination containing medetomidine that addressed some of the problems such as prolonged recovery time, non-reversibility, and poor analgesia that have been identified with the currently preferred drug combination, zolazepam-tiletamine (Telazol (R) or Zoletil (R). During 1995 and 1996, 51 free-ranging polar bears along the western coast of Hudson Bay, Canada, were immobilized with a combination of medetomidine, zolazepam, and tiletamine (MZT). Immobilization with MZT was characterized by a short induction time, low volume, reliable and predictable immobilization and reversibility, adequate analgesia, and relative safety in handling for field personnel. Few adverse physiological effects were observed in any target animals with the exception of a single bear which convulsed and died shortly after it was reversed from anasthesia with atipamezole. We conclude that MZT is an effective drug combination for immobilizing polar bears. However, because of an unexplained mortality, further investigation of the physiological effects of MZT and atipamezole is warranted.

DISCIPLINE: Biology

FIELDWORK LOCATION: Hudson Bay, Northern Manitoba

97-106 DAWSON, R.D. and BORTOLOTTI, G.R. (1997). "Total plasma protein level as an indicator of condition in wild American kestrels (*Falco sparverius*)". Canadian Journal of Zoology, 75:680-686.

ABSTRACT/DESCRIPTION:
Total plasma protein levels were determined for 292 female and 228 male American kestrels (*Falco sparverius*) in the wild. Plasma protein levels were significantly higher in females than in males, and higher during prelaying than during incubation. For both sexes, plasma protein levels did not vary significantly with the number of days before or after egg laying on which the sample was taken, time of sampling, prey abundance, age, molt, or infection by the blood parasite Haemoproteus sp. Protein levels in females increased with date of sampling and body condition during prelaying, while the same pattern was seen in males during incubation. With the exception of those of prelaying females, plasma protein levels increased with ambient temperature. The results of this study suggest that at least some of the variation observed in total protein levels is attributable to physical condition. However, further investigation is required before the reliability of using total plasma protein level as a tool to assess the health and condition of kestrels is known.

DISCIPLINE: Biology

FIELDWORK LOCATION: Besnard Lake, Northern Saskatchewan

97-107 DAWSON, R.D. and BORTOLOTTI, G.R. (1997). "Variation in Hematocrit and Total Plasma Proteins of Nestling American Kestrels (*Falco sparverius*) in the Wild". Comparative Biochemical Physiology, 117A(3):383-390.

ABSTRACT/DESCRIPTION:
Hemarocrits and total plasma proteins were determined at 24 days old for 86 female and 85 male nestling American kestrels (*Falco sparverius*) from the wild in northern Saskatchewan. No sex differences were detected in either hemarocrit or plasma protein. For females, hematocrit and plasma protein were not related to time of sampling, temperature at sampling, mass of nestlings or length of the tenth primary flight feather. In males, hematocrit correlated only with the length of tenth primary. For both sexes. concentrations of plasma protein declined as the season progressed. Differences in brood size, natural and experimental, did not affect hematocrit or plasma protein levels. Of six nestlings that died before leaving the nest, three showed depressed hematocrit values compared with those that successfully left the nest, whereas none showed significant deviations in plasma protein

levels. For 42 birds, we took a second blood sample 2-5 days after the first. Changes in blood parameters of males between these sampling periods were not related to changes in weight, growth of tenth primary or changes in temperature. Among females, there were trends for changes in weight to be correlated with changes in both hemarocrit and plasma protein. Our results suggest that hematocrits and plasma proteins of nestling kestrels are not robust indicators of nutritional status and condition.

DISCIPLINE: Biology

FIELDWORK LOCATION: Besnard Lake, Northern Saskatchewan

97-108 **SANDERCOCK, B.K. (1997).** Factors affecting the breeding demography of Western and Semipalmated sandpipers at Nome, Alaska. Ph.D Thesis, Department of Biological Sciences, Simon Fraser University.

ABSTRACT/DESCRIPTION:
The breeding demography of Western and Semipalmated Sandpipers was studied at Nome, Alaska for four years (1993-96). Breeding seasons were short and both species had similar egg-laying rates, duration of incubation and hatching rates. Clutch and egg size declined seasonally in both species; this is one of the first reports of clutch size variation in birds thought to have a fixed clutch size. Of four explanations tested, seasonal variation in fecundity was most consistent with the parental-quality hypothesis. Egg number was manipulated to determine whether incubation ability limits shorebird clutch size. Experimental clutch enlargement did not affect rates of abandonment, nest attendance or loss of body mass. Incubation length and hatching asynchrony were increased, but hatching success was unaffected. I conclude that incubation capacity does not select for a maximum clutch size of four eggs in sandpipers with bi-parental care, but must be due to other causes. In both species, females were larger than males, but there was no evidence of assortative mating for body size. Local survival was high for both species. Females moved farther than males to remote, but overall, mate fidelity was relatively high. Low fecundity and high survival rates suggest that Western and Semipalmated Sandpipers may be vulnerable to environmental change and thus require conservation effort in the future.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Nome, Alaska

97-109 **SANDERCOCK, B.K. (1997).** "The breeding biology of Red-necked Phalaropes (*Phalaropus lobatus*) at Nome, Alaska". Wader Study Group Bulletin, 83: 50-54.

ABSTRACT/DESCRIPTION:
Red-necked Phalaropes were studied near Nome, Alaska during 1993-1995. Adult females were significantly larger than males in body size, but the difference was small (ca. 2.6 - 4.8 percent). Phalaropes arrived in the first week of May and initiated clutches in the first week of June. There was little annual variation in the timing of breeding or other aspects of fecundity. The majority of clutches contained four eggs, and nest success varied from 29.2 - 70.8 percent. Repeatability was lower for egg volume than chick mass. Male phalaropes had nest attendance rates of 81.3 percent and their flushing distance and behaviour was unaffected by the stage of incubation. Return rates of young and adults were low. Red-necked Phalaropes breeding at Nome had similar morphometrics, fecundity, and

demography as other populations in Alaska, Canada and Finland. The low adult return rates in this species suggest that breeding site fidelity is weak. If so, gene flow may prevent the development of subpopulations that are adapted to local conditions.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Nome, Alaska

97-110 SANDERCOCK, B.K. (1997). "Incubation capacity and clutch size determination in two calidrine sandpipers: a test of the four-egg threshold". Oecologia, 110:50-59.

ABSTRACT/DESCRIPTION:
Several groups of vertebrate taxa, including shorebirds, are unusual in that they produce a fixed number of offspring. The aim of this study was to examine whether the incubation capacity of western sandpipers (*Calidris mauri*) and semipalmated sandpipers (*C. pusilla*) limits their maximum clutch size to four eggs. Experimental enlargement of clutch size had no effect on rates of nest abandonment, nest attendance or loss of body mass by incubating sandpipers. The duration of incubation was significantly longer for enlarged five-egg nests, and there were trends towards increased partial clutch loss and asynchrony at hatch, but overall hatching success was unaffected by experimental egg number. I conclude that small, calidrine sandpipers with biparental care are able to compensate for an additional egg in an enlarged nestbowl, despite the constraints of conically shaped eggs and two brood patches. Possibly, shorebirds do not lay more than a fixed clutch size of four eggs because selection on factors acting during egg production or brood-rearing is more important in regulating offspring number.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Nome, Alaska

97-111 **CHANG, E.R. and JEFFERIES, R.L. (1997).** Seed bank dynamics in degraded and undamaged coastal habitats of the Hudson Bay Lowlands. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
Foraging by lesser snow geese has led to the destruction of coastal salt-marsh vegetation and the establishment of mudflats. The potential for the re-establishment of dicotyledonous plants will depend upon the seeds stored in the soil seed bank. Given these circumstances, the objectives of this study were: 1) to determine the composition of the seed bank in undamaged and degraded soils, 2) to deduce the dynamics in the relationship between species present in the vegetation and the soil seed bank, and 3) to assess the potential for revegetation. Preliminary results indicate large differences in the seed bank composition of intact and degraded sites. The seed bank of degraded areas are dominated by weedy species, in particular the halophyte, *Salicornia borealis*. In contrast, there is a greater diversity of seeds and closer representation of species typical of salt-marsh vegetation in undamaged sites. Seedlings of some of the dominant dicotyledonous species of intact swards have failed to emerge from the seed bank, possibly because heavy grazing of inflorescences by geese has limited seed input into the soil.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: La Pérouse Bay, Northern Manitoba

97-112 **FREITAS, H., DIAMOND, M., SEMKIN, R. and GREGOR, D. (1997).** "Contaminant fate in high Arctic lakes: development and application of a mass balance model". The Science of the Total Environment, 201: 171-187.

ABSTRACT/DESCRIPTION:
Steady- and unsteady-state models based on the QWASI fugacity/aquivalence approach and describing chemical fate in high Arctic lakes were developed and applied to Amituk and Char Lakes on Cornwallis Island, N.W.T., Canada. The model considered characteristics of Arctic lakes, such as water and chemical throughflow, development and depletion of ice cover, and temperature dependence of physical-chemical properties. The model of Char Lake was parameterized and calibrated with literature data for phosphorus, and for Amituk Lake, data were obtained from the Amituk Lake project, focussing on DDT. Model results indicate that Arctic lakes act as conduits, not sinks for chemicals. Most loadings are from snowmelt that enter via stream inflow and most is exported from the lake; minimal amounts of chemicals volatilize or are retained in sediments. Burial is restricted by low-suspended

particle concentrations that convey chemicals to the sediment. An attendant implication of the low-suspended particle concentrations is that nearly all chemicals remain in the dissolved phase in the water column. Consequently, chemical persistence is mainly controlled by water retention time which, for these small lakes, is several years. The illustrative unsteady-state model shows seasonal effects on chemical processes such as cryoconcentration that may increase water column concentrations by up to 15 percent in early May.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Cornwallis Island, Nunavut

97-113 HANDA, T. and JEFFERIES, R.L. (1997). Revegetation Trials in Degraded Coastal Marshes of the Hudson Bay Lowlands. Abstract, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:

Intense foraging (grubbing and grazing) by large numbers of lesser snow geese (*Anser caerulescens caerulescens*) has led to the degradation of coastal habitats, where formerly intact salt-marsh swards have been replaced by hyper saline mudflats primarily devoid of vegetation. In an attempt to understand the processes involved in revegetation of these degraded areas, we are (1) documenting the natural sequence of vegetation change following sward destruction in existing short and long-term exclosures, and (2) conducting assisted revegetation trials whereby native graminoids are planted into mudflats, exclosed from geese, and treated with mulch and/or fertilizer. Results indicate that *Puccinellia phryganodes* and *Carex subspathacea* are capable of successfully establishing in the hyper saline mudflats in the absence of foraging by geese. Treatment responses show that their growth is significantly enhanced by the initial application of a peat-mulch treatment. Depending on the stage of the snow-free season, two properties of the mulch act to enhance growth. In the early season, its insulation properties and low albedo provide a slight increase to the soil temperature which favours plant establishment. Later in the growing season, the mulch retains soil moisture when drought periods typically create a soil water deficit.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Hudson Bay Lowlands

97-114 HELM, P., DIAMOND, M. and SEMKIN, R. (1997). Factors affecting enantio selective degradation of x-hexachlorocyclohexane in arctic watersheds. Presentation, Society Environmental Toxicology and Chemistry, 18th Annual Meeting, San Francisco, CA.

ABSTRACT/DESCRIPTION:
Falconer et al. (1995) have shown the enantio selective degradation of (x-hexachlorocyclohexane (a-HCH) in streams feeding Amituk Lake on Cornwallis Is., N.W.T. (75°02'57" N, 93°45'51" W). We analysed water and snowmelt samples from Amituk Lake collected in 1994, using GC-NI/MS, to determine enantio meric ratios of a-HCH to investigate the extent of degradation. The enantio meric ratio (ER), (+)-(x-HCH/(-)-x-HCH, ranged from a racemic value 1.01 in snow to as low as 0.35 in an inlet stream in early August. The degradation of (+)-aHCH in inlet streams appears to be positively related to stream temperatures over the summer months. ERs in lake water samples obtained at depths of 3, 20, and 40 m varied with depth from a high of 0.90 at 3 m to a low of 0.70 at 40 m, reflecting the extent of mixing of the inflow water with the water column, but did not suggest within-lake degradation. The outflow stream also reflected this mixing, particularly at peak inflow periods. Additional water and sediment samples were obtained upstream of Amituk and at nearby Char and Meretta Lakes to clarify the role of temperature and biological activity on enantio selective degradation.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

97-115 **HUBBS, A.H. and BOONSTRA, R. (1997).**"Population limitation in Arctic ground squirrels effects of food and predation". Journal of Animal Ecology, 66:527-541

ABSTRACT/DESCRIPTION:
We examined the relative importance of food and predators in limiting Arctic ground squirrel (*Spermophilus parryii plesius* Richardson) populations in the boreal forest of the southwestern Yukon during the peak and early decline of a snowshoe hare cycle (*Lepus americanus Erxleben*). Squirrels were live-trapped from 1990 to 1992 on two control grids and three experimental treatments (food addition, mammalian and avian predator exclosure, and food addition plus mammalian predator exclosure). Adult squirrels were radio collared on all areas in 1992. Food addition increased densities 3-8 times, generally increased reproductive traits (increased proportion of females lactating, doubled recruited litter sizes, resulted in earlier emergence of juveniles), increased immigration rates (but only in 1992), resulted in heavier females though not males at emergence in spring, and resulted in more rapid growth rates of juvenile males, but not of juvenile females. It had no effect on active season or overwinter survival rates. Exclusion of predators had virtually no effect on any demographic variable measured, except for population densities in 1991 when they were approximately double those of the control populations. Food addition plus exclusion of mammalian predators resulted in demographic changes that were comparable to those of food addition alone. Thus, it appeared that food, not predators, limited ground squirrel populations at this stage of the hare cycle. However, independent of experimental treatment, active season survival of adult squirrels declined markedly from 1990 (high hare numbers)

to 1992 (low hare numbers). Most of the radio collared squirrels disappearing in 1992 were killed by predators and this was coincident with high densities of predators. In the predator exclosures, all predation mortalities resulted from avian predators which we could not exclude. We conclude that both food and predators interact to limit Arctic ground squirrel populations during the peak and early decline of the hare cycle.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Kluane Lake, Yukon

97-116 KARELS, T. (1997). Population regulation in Arctic ground squirrels. Abstract, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
Factors that limit population size have been the focus of studies of Arctic ground squirrels (*Spermophilus parryii plesius*) in the southwestern Yukon Territory from 1990 to 1996 as part of the Kluane Boreal Forest Ecosystem Project. One experimental treatment had predators excluded, two received supplemented food, and one had both supplemented food and predators excluded. At the completion of the Kluane Project during the spring of 1996, ground squirrel densities on these manipulated treatments ranged from 2 to 16 times the average density of four unmanipulated controls. The return of these populations back to normal control densities provided a unique opportunity to investigate those factors that regulate ground squirrel densities and return densities back to control levels. If populations are regulated, than those factors contributing to the return to control levels should be dependent on population density. Reproduction, survival and dispersal of adult female squirrels were monitored during 1996 and 1997. Dispersal, survival and litter size were independent of density. However, the proportion of adult female squirrels that weaned a litter was density dependent. I conclude that Arctic ground squirrel populations are regulated by food availability through changes in adult female reproduction.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Kluane National Park, Yukon

97-117 KOTANEN, P.M. and JEFFERIES, R.L. (1997). "Long-term destruction of sub-arctic wetland vegetation by lesser snow geese". Ecoscience, 4(2):179-182.

ABSTRACT/DESCRIPTION:
During the last two decades, the mid-continent population of lesser snow geese (*Anser caerulescens caerulescens*), which breeds in the Canadian eastern Arctic, has increased

dramatically to at least 3 million birds. In spring, the birds follow the retreating snowline northwards to the breeding grounds. They forage intensively on shoots of sedges just south of the snowline, eating the swollen shoot bases and discarding the remainder. Exclosures were established in 1985/86 at La Pérouse Bay, Manitoba to determine the effects of protection from foraging on the shoot densities of sedges. Between 1986 and 1995, numbers of shoots increased from 1.1 to 2.2 times in exclosed plots, while numbers in grazed plots declined to between 0.19 and 0.33 times their original values. Sedge assemblages were replaced by moss carpets or standing water rich in peat debris. The ecological significance of the results is discussed in relation to re-establishment of vegetation and the role of herbivores in changing species assemblages.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: La Pérouse Bay, Northern Manitoba

97-118 LIM, D.S.S. (1997). An examination of the limnology and aquatic moss epiphytes of Canadian high arctic ponds (Bathurst Island, N.W.T., Canada). Abstract, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
This study consists of: (a) a limnological survey of 40 ponds on Bathurst Island, N.W.T., in the Canadian High Arctic; and (b) the identification and enumeration of epiphytic diatom assemblages from 16 (of the 40) study ponds from Bathurst island. The results from this investigation compliment a calibration set of diatom assemblages from surface sediment samples taken from 40 Bathurst Island ponds (in progress). The ponds were shallow (Zm<1 m), clear, oligotrophic and freshwater, freezing completely for ca. 10 months as is typical of high arctic sites. Water, algal, zooplankton and sediment samples were obtained from each site in order to describe the abiotic and biotic characteristics.→/← The relationship between specific environmental conditions and the enumerated diatom assemblages, which serve as paleolimnological indicators as well as biomonitors for arctic regions, is invaluable to the creation of baseline data for the continued monitoring of environmental change in the past, present and future.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Kluane National Park, Yukon

97-119 LIM, D.S.S., DOUGLAS, M.S.V., SMOL, J.P. and LEAN, D.R.S. (1997). Limnology of High Arctic Ponds (Bathurst Island, N.W.T., Canada. Abstract, 27th Arctic Workshop, Ottawa, Ontario, February -March, 1997.

ABSTRACT/DESCRIPTION:
A limnological survey of 40 ponds on Bathurst Island, N.W.T., was conducted during July 1994. Water, algal, zooplankton and sediment samples were obtained from each site in order to characterize their abiotic and biotic characteristics. This project further expands our growing database on shallow arctic ponds and deeper lakes. This presentation reports on the physical, chemical analyses of the water samples. The study ponds ranged in elevation from sea level to 600 m asl. Most ponds were approximately 22-300 m wide but, as is typical for most high arctic sites, few exceeded 1 m in depth. All were clear and oligotrophic, with water temperatures ranging from 3 C to 19.5 C in shallower sites. All were within a restricted alkaline pH range (pH = 8.0-8.6), reflecting the calcareous, limy and dolomitic nature of the drainage basins. →/← This work provides an environmental framework for the diatom assemblages and other biota which serve as paleolimnological indicators. Until recently, there have been few published limnological studies carried out on a regional scale in the Arctic. However, these data prove invaluable when attempting to attribute specific environmental conditions to diatom assemblages and other biota which serve as paleolimnological indicators as well as biomonitors for arctic regions. This need for baseline data has become increasingly important since high arctic ponds such as these may be especially sensitive monitors of environmental, both past and present, change.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Bathurst Island, Nunavut

97-120 LIM, D.S.S., DOUGLAS, M.S.V. and SMOL, J.P. (1997). Aquatic Moss Epiphytes from Bathurst Island, N.W.T., Canadian High Arctic. Abstract, 14th North American Diatom Symposium, Douglas Lake, MI, September 24-27, 1997.

ABSTRACT/DESCRIPTION:
Epiphytic diatom assemblages were identified and enumerated from 16 study ponds on Bathurst Island, N.W.T., in the Canadian High Arctic. This study compliments a calibration set of diatom assemblages from surface sediment samples taken from 40 Bathurst Island ponds (in progress). Surface sediment assemblages typically represent an integrated sample of all the micro habitats present within the pond and its catchment. Therefore, given the lack of planktonic diatom assemblages in high arctic ponds, it is speculated that habitat substrates such as submerged mosses will play a key role in determining the composition of surface sediment assemblages. /→

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Bathurst Island, Nunavut

97-121 MCINTIRE, E. (1997). Plant Responses to Simulated Collared Pika Grazing in Southwestern Yukon Territory. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
In the presently glaciated St. Elias Mountains of southwestern Yukon, Canada, rudimentary plant communities occur in isolated and very unstable arctic alpine environmental conditions. Nunataks, or barren rock islands, pierce the ice surface creating a substrate for meadow development and allowing a mammalian herbivore, the collared pika (*Ochotona collaris*), to persist. To examine the impact of the pika on these simplified and rudimentary meadows, I selected and compared sites in two other mountain ranges with similar altitude (1700-2100m), similar latitude 61-621 N, but with much less snow accumulation, different glacial histories and much more extensive plant communities. From each of the three sites, I collected plants of 3 species with differing growth form *(Carex filifolia, Oxytropis nigrescens,* and *Erigeron humilis*), and replanted them together in native ground using a multi factorial design based on grazing history, site of origin, and treatment effects. In this "common garden", located in the site with the most extensive meadows, I examined the responses of individual plants to artificial grazing intensities, ranging from zero grazing, to removal of a total of over 50 percent of above ground biomass in two temporally separate grazing treatments. Initial results demonstrate little response to experimental treatment within the same season. Overall, plants collected from historically grazed sites were greener, shorter, and maintained functional leaves until later in the summer, however, individual species responses differed remarkably. Grazing of plants in these extreme arctic, alpine systems appears to have a selective force establishing ecotypic differences.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: St. Elias Mountains, Yukon

97-122 MILAKOVIC, B. and JEFFERIES, R.L. (1997). Response of Aquatic Invertebrates to the Destruction of Vegetation Triggered by the Foraging Activities of Geese. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
Foraging (grubbing and grazing) by large numbers of lesser snow geese (*Anser caerulescens caerulescens*) has led to the destruction of inter-tidal salt-marsh sward and the death of willow bushes in the supratidal marsh at La Pérouse Bay (near Churchill, Manitoba). A corresponding decline in the abundance of breeding populations of some bird species (stilt sandpiper, semi-palmated sandpiper, northern shoveller, american widgeon) may be linked to low availability of invertebrates in areas devoid or nearly devoid of vegetation. Collections

of aquatic invertebrates were made from 70 ponds in the supra-tidal marsh on different occasions between June and early August, 1996, and 15 of those ponds were resampled intensively between June and early July, 1997. All ponds tended to dry out by early August, but ponds from degraded areas dried out earlier than those in intact areas. The highest salinities and lowest redox sediment values were found generally in ponds from damaged areas. The macro invertebrate assemblages also showed shifts in group representation. Snails (*Gastropoda*) dominated densely vegetated intact ponds and are completely absent from degraded areas, midges *(Diptera: Chironomidae*) preferred more open vegetated ponds, and small copepods (*Copepoda*) dominated degraded ponds. Both snails and chironomids are major food sources for many bird species, particularly duck species such as the american widgeon and northern shoveller. Overall, we are seeing a decline in invertebrate diversity in degraded supra-tidal marsh areas at La Pérouse Bay as well as potentially detrimental shifts in the abundance of certain organisms in both aquatic and terrestrial systems. These changes are an indirect consequence of the foraging activities of the lesser snow goose.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: La Pérouse Bay, Northern Manitoba

97-123 SHEATH, R.G. and MULLER, K.M. (1997). "Distribution of Stream Macroalgae in Four High Arctic Drainage Basins". Arctic, 50(4):1-10.

ABSTRACT/DESCRIPTION:

Eighty-three stream reaches were sampled from four drainage basins in the central portions of Axel Heiberg and Ellesmere Islands. The streams included small snowmelt tributaries, those flowing through wetlands, pond outflows, glacial meltwaters, and large trunk rivers, some of which had become braided in their lower portions. Larger channels tended to be quite turbid, and macroscopic algae were negligible in these reaches because they lack adequate light and hard substrata for attachment. The overall stream macroalgal flora was relatively small (15 species) compared to that of other regions of the North American tundra. Cyanobacteria and Chlorophyta accounted for all but one species. The most widespread species was the colonial cyanobacterium, Nostoc commune. Only Scytonema mirabile (*Cyanophyta*) was a new addition to the stream macroalgal flora of arctic North America. The number of species per stream reach ranged from 0 to 5, with a mean of 1.3. The amount of stream bottom covered by macroalgae was 0 to 75 percent, with an average of ca. 5 percent. Both species number and percent cover per reach are relatively low.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Axel Heiberg and Ellesmere Islands, Nunavut

97-124 SPENCE, C. (1997). Fertility Control and the Management of Northern Wolf Populations. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
In 1992, the First Nations of the southwest Yukon called upon the Yukon government to help recover the declining moose (*Alces alces*) and caribou *(Rangifer tarandus*) populations upon which they depend for subsistence. Since then, government biologists have been shooting and trapping gray wolves *(Canis lupus*), an important natural predator of big game. Ungulate calf survival has increased as a result of the predator control program, but lethal wolf control is expensive, controversial, and is at best a short term solution. Public opposition has led to an exploration of fertility control, defined as the artificial reduction of a population's birth rate by temporarily or permanently sterilizing individuals. I have studied the social and territorial behaviour of 6 wild wolf packs in which the breeding pairs have been surgically sterilized. If wolf behaviour is unaltered by sterilization, fertility control may be a viable and cost effective alternative to lethal control. In addition, I have used long-term wildlife data to build computer models which will simulate the effects of fertility control, harvest, and weather upon predator and prey populations. This study, in collaboration with the Yukon government and Kluane National Park, has involved an ongoing public process and the close cooperation of local First Nation bands, residents, and special interest groups.

DISCIPLINE: Biology

FIELDWORK LOCATION: Kluane National Park, Yukon

97-125 SPENCE, C., HAYES, R.D. and HIK, D.S. (1997). Fertility control and the management of northern wolf populations. Conference Proceedings, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
The need for active population management of problem species is perceived in many contexts. In the southwest Yukon many people rely upon ungulate populations for subsistence harvest. Declines in prey populations are due in part to wolf predation. While direct lethal control of wolf populations has been demonstrated to result in an increase in prey survival and reproduction, this form of management is not supported by many in the public, and may be ecologically unsound. We investigated the possibility of using fertility control to limit the growth of wolf populations on caribou calving grounds. Results to-date suggest that fertility control is a useful management tool for reducing wolf predation on ungulate populations when their numbers are small or declining.

DISCIPLINE: Biology

FIELDWORK LOCATION: Kluane National Park, Ruby Range, Yukon

97-126 SVOBODA, M. (1997). Effect of Road and Tailing Pond Dust on Tundra Plant Communities Around the Lupin Mine, N.W.T. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:
There are distinct plant communities around the roads and tailing ponds associated with the Lupin gold mine, N.W.T. The construction of gravel roads and tailing ponds since 1980 has altered the original landscape. These changes have affected the micro environment near these disturbed sites. With the dust deposition comes an earlier snow melt on the margins of the roads and tailings areas, speeding up the plant phenology and releasing the sites to animals for spring grazing prior to sites located further from the dust sources. We are investigating the possibility that the vegetative communities have already changed in comparison to their original state since the construction of the haul road and tailings ponds. We measured the dust deposition rates along the transects perpendicular to the roads and tailings areas. We found that the vascular plant diversity was reduced in the dust deposition zones but the percent cover for the vegetation was higher there. The data are subject to Twinspan analysis for spacial differentiation and species abundance along the transects. Preliminary results indicate differences in the plant communities with respect to their distance from the disturbance.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Lupin Mine, N.W.T.

97-127 **DEL GIUDICE, L. (1997).** The Relationship Between Stomatal Conductance and C02 in a Subarctic Forest Near Churchill, Manitoba. Paper, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:

Little is known about how subarctic forests influence the exchange of gases with the atmosphere. Subarctic forests are characterized by stunted, sparsely distributed coniferous trees and by a shrubby substory. The purpose of this study was to assess the behaviour of subarctic vegetation with respect to carbon dioxide and water vapour exchange. Stomatal conductance and transpiration were measured for five vegetation species in a forest at the treeline near Churchill, Manitoba. Measurements were taken using a steady-state porometer during most of the growing season in 1997. Three adjacent sites with differing light and soil moisture regimes were examined. One objective of the research was to assess the diurnal and seasonal trends of gas exchange. A second objective was to examine differences in conductance between species and between sites. This presentation reports on preliminary results only.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-128 **STUART, C. (1997).** Influence of stake density on confidence in mass balance estimates White Glacier, Axel Heiberg Island, Canada, and Abramov Glacier, Kirghizia. Paper, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:

Mass balance data have been collected continuously since 1959 and 1968, with a three year and one year gap respectively. Mass balance data have been collected on White Glacier using the stratigraphic system as outlined by Ostrem and Brugman (1991). The stake network density on White Glacier is 0.6-0.9 per km^2 , having decreased from 2-3 per km^2 in previous years. The stake network density on Abramov Glacier is much higher, having remained fairly constant at 5-7 per km^2. There has been some indication that, although an increase in the stake network density may create a better picture of the glacier, this does not necessarily mean a decrease in the uncertainty of the year-end mass balance estimates. The primary purpose of this research is to determine the influence of stake network density on the uncertainty of mass balance estimates on White and Abramov glaciers. For each glacier, time series of stake mass balance will be correlated with each other and with the series for the whole glacier. The decrease of correlation with increasing distance between stakes will be

the basis for estimating the uncertainty of whole glacier mass balance as a function of the number and uncertainty of stake mass balance measurements. It is expected that this research will improve collection of mass balance data in the accumulation zone of White Glacier, as well as improving existing and determining future stake networks.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Axel Heiberg Island, Nunavut

97-129 **WILLIAMSON, M., NOL, E. and WILLIAMS, J.B. (1997).** Basal Metabolism and Incubation Energetics of an Arctic Nesting Shorebird: Physiological and Behavioral Considerations. Paper, Society of Canadian Ornithologists meeting, Peterborough, Ontario, August 9, 1997.

ABSTRACT/DESCRIPTION:
The Semipalmated Plover, an Arctic nesting shorebird, regularly faces an austere environment during the incubation season. I measured the basal metabolic rate (BMR) of eight adult birds during incubation at Churchill, Manitoba using a metabolic chamber and gas analysers. Lower critical temperature (LCT) was also measured and found to be 24.8 C. Both BMR and LCT were consistent with those of other temperate migrants breeding in the Arctic. Both values were determined using multiple allometric nonlinear regressions. Incubation behaviour in the field was also studied in 24 hour cycles. In conjunction with these behavioural data, internal egg temperatures were monitored using one or two thermocouples inserted into eggs. It was found that internal egg temperatures of Semipalmated Plovers may fall as much as 15-20 C below an optimum of 38.5 C for periods of varying duration during a 24 hour period, and are regularly incubated at temperatures of 31-33 C for extended periods. In extreme weather conditions, incubating birds left eggs unattended to forage, resulting in steep internal egg temperature declines. These behaviour data combined with a high LCT suggest that Semipalmated Plovers must balance the requirements of incubation against their own energetic demands, especially in harsh conditions.

DISCIPLINE: Biology

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-130 **KOENIG, B.G. (1997).** Latitudinal Patterns of Polychlorinated Biphenyls (PCBs) in Zooplankton. M.Sc. Thesis, Faculty of Graduate Studies, York University.

ABSTRACT/DESCRIPTION:
High levels of organochlorine contaminants (OCs) have been recorded in environmental media in the Canadian Arctic. OCs migrate from urban to pristine areas via volatilization and deposition processes. The goals of this study were to a) assess concentrations of polychlorinated biphenyls (PCBs) in freshwater biota from southern Canada to the Arctic, and b) test the global fractionation model which predicts that semi-volatile compounds will predominate at high latitudes and that proportions of less volatile OCs will be higher in the south (i.e. near purported sources) than in the north. Preliminary studies addressed the a) utility of three operationally-defined zooplankton size fractions (>40, >150 and >500 Am) as biomonitors (i.e. for direct measurement of residue levels), b) the effect of food web structure (i.e. presence/absence of piscivores) on PCB concentrations in these fractions and c) seasonal variability of PCB concentrations in zooplankton from two temperate lakes and one arctic lake. Two lakes (Ranger Lake: 45 09'N, Mouse Lake: 45 11'N) with similar chemical, physical, and morphometric characteristics, but different food web structures, were evaluated for a) and b). →/← Analysis of covariance showed that the lower chlorinated tetra- through hexachlorobiphenyls decreased at a similar rate but that tri-, hepta- and octa-chlorinated congeners together decreased at a faster rate to the northern latitudes. This demonstrated that at high latitudes, the proportions of the tetra through hexa- congeners were higher than at southern latitudes. In contrast, the proportions of tri-, hepta- and octa-congeners were higher at lower latitudes than in Arctic regions. With the exception of the trichlorinated congeners, these results confirm the predictions of the global fractionation model. The anomalous trend of the trichlorinated biphenyls may be related to the timing of sampling and it was suggested that trichlorinated congeners may either not condense at arctic latitudes during the summer or may re-volatilize at a significant rate, or that this occurrence is related to an unusual distribution of congeners observed in arctic air during July 1993.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Resolute Bay, Cornwallis Island, Nunavut

97-131 **MACRAE, M. (1997).** Variations in Organic Carbon Accumulation in Shallow Tundra Ponds. Presentation, 27th Arctic Workshop, Ottawa, Ontario, February-March, 1997.

ABSTRACT/DESCRIPTION:
Churchill, Manitoba hosts many small, shallow tundra ponds, which differ in both their water

chemistry and the characteristics of their sediments. These ponds are far more alkaline than ponds in other wetlands, ranging in pH from 7 to 9.5. These ponds have likely attained such high pH values as a result of a concentration of cations over time. Lateral seepage is negligible in these ponds, and water balances are limited to only precipitation and evaporation for most of the growing season. Another notable feature of these ponds is the variation in both the amounts and compositions of the sediments that they contain. The sediments range from 9-94 percent organic matter, from 0.05 to 0.92g/cm3 in bulk density, and from 8 to 35 cm in mean sediment depth. The amount of organic carbon accumulating per square metre in the ponds ranges by an order of magnitude, and the total volume of carbon being stored in the ponds varies by nearly two orders of magnitude. Possible explanations for such differences in the amount of carbon accumulating may be related to differences in productivity or decomposition between the ponds.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-132 MACRAE, M. (1997). An Examination of Sediment Content in Ponds in the Hudson Bay Lowland. Presentation, Association of Canadian Universities for Northern Studies, 5th National Students' Conference on Northern Studies, Burnaby, B.C., November 28-30, 1997.

ABSTRACT/DESCRIPTION:

There is wide interest in the role of wetlands in the global carbon budget. Wetlands are known to be a vast carbon pool; however, the amount of carbon being stored in wetlands remains unknown. It is important to determine how much carbon is being stored in wetlands in order to estimate the potential contribution of wetlands to the Greenhouse Effect. The Hudson Bay Lowland is an extensive Subarctic wetland in Canada that contains a large pool of carbon in the form of peat. This region also hosts many shallow ponds, which may occupy up to 40 percent of the landscape. We have recently determined that these ponds also contain a pool of organic carbon in their sediments. This carbon pool in the ponds has been neglected in previous studies attempting to quantify carbon storage in wetlands, and therefore presents a gap in our knowledge of the carbon budget of this region. While there is a need to quantify the pool or organic carbon being stored in the pond sediments, this cannot be done easily because the ponds have large spatial variations in the amounts of carbon they are storing. Though the carbon in some ponds is comparable to that in the surrounding peat, other ponds have either much more or much less carbon than the peat. Research conducted in 1996 determined that the ponds differ by an order of magnitude in the amount of carbon being stored per unit area, and by two orders of magnitude in the total amount of organic carbon being stored in them. Before we can estimate the carbon pool stored in the pond sediments in the Hudson Bay Lowland, we must first examine the ponds on a smaller scale and explain why the ponds have such large variations in organic carbon storage. Two questions are being

addressed in this research: 1. How much organic carbon is being stored as pond sediments? 2. Why is there such large variation in the amounts of organic carbon being stored?

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Churchill, Northern Manitoba

97-133 PACE , J.F. (1997). Water Storage Patterns and Plant Response of Two Saturated Zones in the High Arctic Influenced by the Melting of a Late-lying Snowbank. Honours Thesis, Department of Geography, York University.

ABSTRACT/DESCRIPTION:

The interactions between hydrologic conditions and plant response of two saturated zones receiving different modes of meltwater inputs, from a late-lying snowbank were studied over the summer of 1996 in Resolute, N.W.T. One site received direct inputs of surface meltwater inflow, and the other site received subsurface meltwater inflow originating from the surface fed site. Plant productivity of two distinct vegetated zones were measured at each site; one a sparsely vegetated area, and the other a more complete vegetated wet meadow environment. Low plant growth occurred in the sparsely vegetated sites and reflects the lower soil moisture and water tables. Plant growth was found to be more productive in the wet meadow zones which had higher moisture contents as result of a high water table located at or above the surface for most of the summer. The wet meadow zone at the subsurface fed site was two times more productive than the surface fed site, and may be due to a greater nutrient availability. This study indicates the importance of water flow patterns on plant growth in small, vegetated, patchy sites of High Arctic environments.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

97-134 YOUNG, L. and PACE, J.F. (1997). Water storage patterns and plant response in two high Arctic wetlands influenced by an ablating late-lying snowbed. Report, Canadian Geophysical Union-Hydrology Section Conference, Banff, Alberta, May 6-9, 1997.

ABSTRACT/DESCRIPTION:

Few studies have examined the interactions between water and plants in High Arctic wetlands receiving meltwater inputs from late-lying snowbeds. In this study, we examined the soil moisture, water table fluctuations, and plant response of two high arctic wetlands: one receiving direct inputs of surface waters from an ablating snowbed, and another receiving subsurface waters originating from the same late-lying snowbed. The two wetlands separated by approximately 100 inches of gravelly material, are found in the McMaster

Basin, near Resolute Bay, N.W. T. A water balance framework allowed the soil moisture and water table fluctuations to be examined. Transects of water pipes dissected both non-wetland and wetland terrain. On a regular basis, frost table, surface soil moisture measurements were made near pipes while water levels in the pipes were monitored electronically. Snowmelt was measured at each site and on the late-lying snowbank. Summer precipitation was measured by manual and recording rain gauges and evaporation was monitored by lysimeters. Distinct vegetation zones (3-5) were identified at each site. Once a week, three quadrats (0.20=0.50m) were randomly placed in these zones and aboveground plant biomass was clipped. Vegetation was oven-dried, and separated into live and dead biomass. Soil moisture was slightly higher in the surface fed wetland with both showing fluctuations due to melt water and summer rainfall inputs and evaporation loss. Low soil moistures (less than 20 percent) existed in sparsely, vegetated zones lying adjacent to these saturated zones. Water tables were high, often persisting above the ground surface in both the surface and subsurface-fed wetlands while water tables fell below the ground in the surrounding sparsely-vegetated gravel zones. In the surface-fed wetland, peak plant productivity was four times greater in the wet meadow than the sparsely-vegetated zone and in the subsurface-fed site, this difference was five times. Overall, peak plant productivity (both total and live) was 2X greater at the subsurface site than at the surface-fed site, but timing of peak productivity was one week later. Greater plant growth at the subsurface-fed site may be a reflection of higher nutrient availability.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

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UNIVERSITY OF ALBERTA

98-001 ARENDT, A. (1998). Approaches to modelling the mass balance of high Arctic glaciers. M.Sc. Thesis, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
Comparisons are made between degree-day and energy balance model simulations for John Evans Glacier, Ellesmere Island, Nunavut, Canada. The average specific mass balance of John Evans Glacier from 1996 to 1997 was 0.016m WE from energy balance model predictions, and 0.13m WE from degree-day model predictions, compared with 0.15m WE from ablation stake measurements. A physically-based surface albedo routine is developed which is driven by variations in the solar zenith angle and snow grain size, and is highly sensitive to prescribed values of surface slope and azimuth. A physically-based superimposed ice formation routine, based on heat flux calculations at the snow-ice interface, is shown to produce the best predictions of measured superimposed ice thickness and ice temperatures. For degree-day model simulations, a method of determining positive degree-day factor variations through the melt season is developed. This method relates empirically predicted effective snow grain radii to positive degree-day factors for snow.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: John Evans Glacier, Ellesmere Island, Nunavut

98-002 DAVIS, W.A. (1998). Responses of tundra vegetation, soil, and microclimate to disturbances of the CANOL pipeline. M.Sc. Thesis, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
Six disturbance types in the Decumbent Shrub Tundra associated with the construction of the CANOL No. 1 Pipeline were identified. Resultant plant associations are the product of >50 yrs of natural revegetation. Relative abundance of individual plant species was measured to determine plant community composition. Soil development was analysed using soil texture, nitrogen levels, moisture content, bulk density, near-surface temperatures and depths of thaw. The total flora of the undisturbed tundra was 125 species. *Salix polaris* was the most common species occurring in 86 percent of sample quadrats. Forbs and bryophytes were the richest taxonomic groups. Significant differences in measured variables within the control were due to patterned ground. Indirect ordination indicated a wide variation in species composition from poorly vegetated borrow pits to well vegetated vehicle tracks and overburden spoil piles. Near-surface temperatures in all disturbance types increased. NH4 and N03 levels were highest in wet, organic rich samples. With direct ordination the most important environmental variable determining differences among disturbance types was

percent gravel content. The replacement of topsoil material was an important factor in natural revegetation processes.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: CANOL No. 1 Pipeline, N.W.T.

98-003 GAGNIER, P.Y, WILSON, M.V.H. and. HANKE, G.F (1998). "A new Acanthodian from the early Devonian of the Northwest Territories, Canada". Ichthyolith Issues, Special Publication No. 4, Circum-Arctic Palaeozoic Faunas and Facies.

ABSTRACT/DESCRIPTION:
A new acanthodian species is found at 180m in the MOTH section, central Mackenzie Mountains, N.W.T., Canada. The fish-bearing interval occurs in strata that correlate with parts of the Road River Formation and Delorme Group in that area. Faunal correlations point to an Early Devonian (Lochkovian) age. The general body shape is of a small acanthodian of medium body depth with two dorsal fins preceded by spines, pelvic spines originating slightly posterior to the origin of the first dorsal fin spine, and anal fin spine originating posterior to the second dorsal spine. The body axis turns slightly upward into the caudal fin. The morphology of the five known specimens (UALVP 38682, 39062, 39078, 39084 and 42512) recalls that of a diplacanthid. There are no head bones, except for jaws, scales and tesserae. The eyes are small for an acanthodian, anteriorly placed, and lack circumorbital plates. The mouth is subterminal or slightly inferior, with its anterior extremity reaching the anterior part of the orbit. Neither branchiostegals nor branchial covers are discernible. The jaw bones are distinctive, short, and massive ossifications, apparently lacking teeth and with a flat masticatory surface. /→

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

98-004 HANKE, G.F. and WILSON, M.V.H. (1998). "Examination of shark-like scales from the Mackenzie Mountains, Northwest Territories". Ichthyolith Issues - Special Publication (2):15.

ABSTRACT/DESCRIPTION:
Shark-like scales were reported from surveys at the MOTH locality 1963-96. The largest (type 1S) have no apparent base or pulp cavity. These resemble *Antarctilamna sp.* and *Cladolepis gunneli* in overall proportion and have similar heavily-ornamented crowns. Crown ridges also resemble those of *Ochiolepis* short in the anterior third of the scale, elongate posteriorly and terminating in spines. Smaller (type 2S) scales have very fine

parallel crown ridges and a shallow base in the anterior 3rd of the scale. Ridges of 2S scales resemble *Elegestolepis* and *Apalolepis obruchevi*, and terminate at a finely serrated posterior edge. A 3rd (type 3S) is identified by pronounced lateral basal flanges and a single median crown ridge and scales of *Moreyella*. Articulated 3S scale patches show gradation from narrowly-ridged body scales to scales with broad teardrop shaped crowns at the leading edge of fins. Several 3S patches have associated straight, shallowly-inserted spines. A 4th type is *Polymerolepis*. Two other patches recorded in 1996 do not correspond to any taxa previously described in MOTH fauna; these are also associated with fin spines and are similar to *Caldolepis sp.* from Morocco.

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

98-005 **HANKE, G.F. and WILSON, M.V.H. (1998).** "Structure and variation of Acanthodian and Chondrichthyan scales from the lower Devonian, Mackenzie Mountains". Journal of Vertebrate Paleontology, 18(3):48A.

ABSTRACT/DESCRIPTION:
Acanthodian fishes historically were described as 'spiny sharks'. Recent phylogenetic analyses suggest that *chondrichthyans* are united with placoderms in the *Elasmobranchiomorphi*. But few articulated specimens are known for many early representatives of the *Acanthodii*, with many taxa represented only by isolated scales and/or fins spines, making phylogenetic analyses difficult. A lack of articulated skeletal remains of early representatives of the *Chondrichthyes* makes it very difficult to assess characters of potential phylogenetic importance and to estimate variation for species known from isolated scales. Early Devonian articulated acanthodian and chondrichthyan remains from the MOTH locality have scale growth patterns and spine histology that allow assignment to *Acanthodii* or *Cgindrichtyes*. For most species, both isolated micro remains and articulated specimens showing scale variations are available. Several forms show chondrichtyan patterns of scale growth of non-growing and growing types, and in some cases the specimens have associated fin spines. Other forms have scale growth typical of acanthodians; a very diverse fauna of acanthodian specimens exists at the site. Characters from the scales and spines and features of body morphology are being evaluated to assist in phylogenetic studies of these taxa, while comparison of micro remains and articulated specimens from the same beds will clarify the range of variation.

DISCIPLINE: Biology

FIELDWORK LOCATION: Mackenzie Mountains, N.W.T.

98-006 HANKE, G.F. and WILSON, M.V.H. (1998). "Scale and spine characteristics of lower Devonian Acanthodians and Chondrichthyans from Northern Canada." Journal of Vertebrate Paleontology, 18(3):48A

ABSTRACT/DESCRIPTION:
Acanthodian fishes historically were described as 'spiny sharks'. Recent phylogenetic analyses suggest that chondrichthyans and placoderms are united in the *Elasmobranchiomorphi* rather than chondrichtyans showing relation to acanthodian fishes. Unfortunately, few articulated specimens are known for the earliest representatives of the *Acanthodii* and *Chondrichthyes*, with most taxa known from isolated scales and spines. Isolated scales and spines of Lower Devonian fishes can be assigned to class using established histological and growth characteristics. Articulated gnathostome remains recently collected from the MOTH locality provide a unique opportunity to examine scale and spine structure variation on well preserved, articulated specimens. Several recently-discovered fishes from MOTH appear to possess a mosaic of chondrichtyan and acanthodian characteristics. Histological examination of scales and spines of fishes that appear to be chondrichthyans is presented, and compared with the similar structures from described acanthodians from the same locality. Histological examination of spines and scales is used to verify initial identifications of these MOTH locality fishes to class. Confirmed identification of fishes to class using established histological characteristics will provide a valuable framework for subsequent analysis of the evolution of other anatomical structures of non-placodern gnathostomes.

DISCIPLINE: Biology

FIELDWORK LOCATION: MOTH Locality, Mackenzie Mountains, N.W.T.

98-007 HORVATH, C.L. (1998). An evaluation of ground-penetrating radar for investigation of palsa evolution, MacMillan Pass. M.Sc. Thesis, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
The utility of ground-penetrating radar (GPR) for investigation of perennially frozen peatlands is examined. Palsa evolution is inferred from GPR and conventional data from two sites near Macmillan Pass, Northwest Territories. Data processing techniques adapted from seismic applications are tested. GPR consistently imaged sub-peat topography in palsa and fens, and detailed fen stratigraphy, but generally did not clearly image palsa core stratigraphy. Radar-imaged domed strate and frost penetration into underlying mineral sediment are correlated with palsa genesis by ice segregation, an inference supported by coring. Stratigraphic discontinuities are correlated with a known palsa collapse scar, GPR may therefore support reconstructions of peatland history by imaging stratigraphic signatures of pre-existing permafrost landforms. Thaw degradation at depth was imaged by GPR and

corroborated by coring and historical evidence. Seismic data processing improved vertical resolution and lateral continuity of fen reflections, but was less effective in improving resolution of radar data from palsa.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: MacMillan Pass, N.W.T.

98-008 LAMOUREUX, S. (1998). Distinguishing between geomorphic 7 hydrometeorological controls recorded in clastic varved sediment. Ph.D. Thesis, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
Varved sediments from Nicholay Lake, Cornwall Island, were collected as a proxy hydro climatic record. The seasonality of streamflow, sedimentology and 137Cs and 210Pb profiles support the varve interpretation. Temporal variability of lake and catchment controls that alter the accumulation of varves was investigated with annual isopach maps, to identify deposition changes related to shifting delta distributaries and slumps. The resulting 493yr sediment yield record retains the range of past hydroclimatic conditions, especially large magnitude events. Extreme deposition in 1951 and 62 was related to the 2 largest recorded rainfalls at Isachsen. The temporal pattern of rainfall yield events indicates wet conditions coincided with the coldest periods of the "Little Ice Age" (LIA), as shown by other temperature-sensitive proxy data. Increased sediment yield and rainfall frequency also agree with observations of cooler summers and increased frequencies of cold-wet synoptic types after 1962. The timing of these cold-wet episodes is similar to several known volcanic eruptions which have been previously used to explain LIA cooling. Sediment yield shows a general positive correlation with the ice core acidity record, suggesting that volcanism was an important climatic force during this period. The varve record indicates that a rainfall response was linked to large-scale synoptic changes that persisted for several years after eruptions rather than to an abrupt, short-lived temperature response.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Nicholay Lake, Cornwall Island, Nunavut

98-009 ROSS, J.M. (1998). Archaeobotanical remains from the Hall (XVII). Research Report, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
In 1995 and 1996 a University of Alberta contingent was added to the international and interdisciplinary team of researchers excavating on Garden Under Sandet (GUS) site. This

contingent investigated the archaeobotany and geoarchaeological aspects of the site. A Viking hall (room XVII) was discovered and excavated in 1995 and 1996 field seasons. This hall is unique as it presents the only hall from which macro-botanical remains have been collected in Greenland.

DISCIPLINE: Archaeology

FIELDWORK LOCATION: Garden Under Sandet, Greenland

98-010 ROSS, J. M. (1998). "Geoarchaeology applied to early Bronze-Age graves at Kzhuzhir-Nugc XIV. bbk, 63.4(2):510-513.

ABSTRACT/DESCRIPTION:
The focus of Russian archaeology in the Lake Baikal region has been the development of cultural histories. Both mortuary and multi layered habitation sites have been discovered in this region which provides the opportunity to incorporate data from both ritual and daily context, into cultural histories. This concentration of research on developing cultural histories has resulted in graves being assigned to specific cultures, Kitoi, Serovo and Glazkovo based in part on grave attributes assumed to be determined by cultural factors. Mortuary archaeologists investigate grave attributes such as grave type, size, shape and depth as well as grave goods, body orientation and position to reconstruct a culture's social organization, an individual's specific status and ritual activities. It is generally accepted that at least some grave attributes, being the result of cultural activities, will reflect aspects of the culture. Non cultural (i.e. natural) factors, however, may play a larger than expected role in shaping the above attributes. Khuzhir-Nuge XIV, mortuary archaeological site is located on a windy hillside between two ridges of bedrock having an east-west orientation. In 1997, a 30-member Russian-Canadian crew excavated 17 units containing 14 graves. Field observations of architectural attributes and grave content of the 14 graves suggest different cultural practices were employed: some graves contained evidence of fire use; content of grave goods varied; body position varied from extended to semi-flexed with varied position of arms and legs. The architectural attributes of the graves seem to be dictated by land forms, formation processes and stratigraphy which can all be investigated using geoarchaeological methodology. Twelve of the graves were oriented east- west: two had a more north-south orientation. Almost directly surrounding and under the skeletons lay the limestone bedrock which was very angular in some cases and rounded in others. The bedrock in these burials determined the depth, shape, size and orientation of the grave pits except in two incidents. The north-south oriented graves occurred at locations in which the bedrock structure was less apparent or not evidently associated with the skeleton. The sediment outside the burial area was very heterogeneous in composition with the gram size ranging from a silt to a medium sized gravel. As a result of field observations it was realized that body orientation correlates to ridge orientation with the depths of most of the grave pits corresponding to the depth of the bedrock layer from the surface which ranged 40 - 100 cm in depth.

DISCIPLINE: Archaeology

FIELDWORK LOCATION: Lake Baikal, Siberia, Russia

98-011 ROSS, J. M. (1998). A paleoethnobotanical investigation of GUS Norse Farm Site, Western Settlement, Greenland. M.A. Thesis, Faculty of Graduate Studies, University of Alberta.

ABSTRACT/DESCRIPTION:
Garden Under Sandet, GUS, is a Norse age central farmstead in the Western Settlement of Greenland. Archaeobotanical samples were collected during the 1995 and 1996 seasons; 42 of the 139 samples collected were analysed. The archaeobotanical remains are excellently preserved because the site was sealed by alluvium and permafrost. The Western Settlement was established by the Norse in ca. AD 1000; the Greenlandic economy of the times was based on animal husbandry and hunting. The Norse relied on infields and outfields to provide fodder and construction material resulting in a heavy reliance on vegetation. The abandonment of the Western Settlement (ca. 1350) may have been caused by many factors but of those suggested only caterpillar attack, climate change and non-sustainable land-use practices could influence the archaeobotanical assemblage. Norse archaeobotanical assemblages are created by dynamic formation processes which must be carefully determined. To avoid formation processes resulting in general interpretations, a specific sampling is suggested and should be implemented. Samples from the long house may indicate use of different fuels. A few anthropochores present in these samples indicate that the vegetation was quickly changed. Anthropochores later dominate the samples indicating weeds became prolific. Analysis of manure showed cows ate Grass or Heath/Outfield plants and caprines grazed on Heath/Outfield plants or on plants from mixed groups.

DISCIPLINE: Archaeology

FIELDWORK LOCATION: Garden Under Sandet, Greenland

98-012 SMITH, I.R. (1998). Late quaternary glacial histories and Holocene paleoenvironmental records from NE and SW Ellesemere Island, Nunavut. Ph.D. Thesis, Faculty of Graduate Studies and Research, University of Alberta.

ABSTRACT/DESCRIPTION:
Ice-free areas beyond the limits of the last glaciation have been proposed for much of Ellesmere Island. This hypothesis is addressed by reconstructing the late Quaternary glacial history of Lake Hazen Basin and eastern Hazen Plateau, and by coring extant lake basins beyond proposed ice margins. Diatom records from these lakes, and staple isotope records from emergent basins on Hoved Island SW Ellesmere Island, were used to assess Holocene

environmental changes in the High Arctic. Lateral meltwater channels, moraines, and other geomorphic evidence indicate that a large trunk glacier emanating from the Grand Land Mountains (GLM), coalesced with Agassiz and Greenland Ice, inundating Hazen Plateau. Ice-free regions did not exist in the Lake Hazen region. Breakup of marine-based ice margins between 9 and 8kaBP led to a re-retreat of GLM trunk ice, and deglaciation of outermost Hazen Plateau. Plateau ice caps, however, peristed and expanded over highland regions in early Holocene. Between 7 and 6kaBP, ice retreated to the heads of regional fiords and valleys; then it remained stable. Breakup of ice occurred between 5.3 and 5kaBP; at that point GLM ice had retreated to near its modern limits. A gradual climatic amelioration occurred in the LH region between 5 and 4kaBP; with the greatest reduction in ice cover occurring between 4 and 3kaBP, Isotopic records detail a stepsped ice retreat during early to mid-Holocene, beyond the resolution of previous studies of postglacial emergence.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

98-013 WILSON, M.V.H., SOEHN, K.L., HANKE, G.F. and MARSS, T. (1998). "Preliminary vertebrate biostratigraphy of the Silurian Avalanche Lake Sessions, Mackenzie Mountains, N.W.T., Ichthyolith Issues, Special Publication 2:26-27.

ABSTRACT/DESCRIPTION:

The Avalanche Lake sections are intensively studied exposures of the intertonguing Road R. and Delorme formations in the Mackenzie Mountains. Important heterostracan and *Thelodonti* elements of the vertebrate fauna have been described but their biostratigraphic significance is only now being addressed. Both heterostracan and *Thelodonti* fossils fall into 2 strategically distinct assemblages that may prove to have biostratigraphic utility. The lower heterostracan assemblage includes *Athenaegis Chattertoni cf. Tolypelepis sp.* and at least 8 undescribed *cyathaspidiform* genera and species. The lower *Thelodonti* assemblage consist of *Lanarkia horrida* with *Thelodonti gen.*, et.*sp.nov.*, and the Silurian "fork-tailed *Thelodonti*". The upper heterostracan assemblage includes numerous *cyathaspidiforms* representing new genera and species. The upper *Thelodonti* assemblage is characterized by *Loganellia martinssoni* and *L. sp.nov. Thelodonti* biostratigraphy of the AV sections together with trilobite studies that allow correlations with graptolite-bearing strata in Arctic Canada and elsewhere suggest late Telychian-early Scheinwoodian ages for both the lower heterostracan and lower *Thelodonti* assemblages, and early-late Homerian ages for the upper ones. Clarification of the ages of the assemblages, together with new information are now becoming available from Arctic Canada, and should help in correlation of vertebrate-bearing beds throughout the northern Cordilleran and Arctic regions.

DISCIPLINE: Biology

FIELDWORK LOCATION: Avalanche Lake, Mackenzie Mountains, N.W.T.

98-014 FRID, L. (1998). The influences of herbivores and neighbouring plants on risk of browse. B.Sc. Thesis, Faculty of Science, University of British Columbia.

ABSTRACT/DESCRIPTION:
Various factors were tested for their influence on the probabilities that an individual lupine (*Lupinus arcticus* S. Wats: *Fabaceae*) was browsed by late June and late July. Risk of browse was significantly influenced by (i) the number of resident ground squirrels at nearby burrow systems, (ii) ground squirrel density at a site, (iii) the leaf density of conspecific, other palatable species and unpalatable species in the patch an individual lupine is found in, and (iv) the number of leaves on an individual lupine. The distance from a lupine to the nearest ground squirrel burrow entrance had no influence on the probability that that lupine was browsed.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Kluane Lake, Yukon

98-015 HOPE, S. and KIMMINS, J.P. (1998). Structure, Processes and Diversity in successional forests of coastal B.C. Conference Proceedings, Saskatchewan Boreal White Spruce Forests, Saskatchewan, February 17-19, 1998.

ABSTRACT/DESCRIPTION:
The focus of this research is to understand the role of forest floors in contributing to boreal forest suitability and to determine how structure and process relate in separating different phases of white spruce development. Tree height, diameters, pathology and age were recorded. Fallen log inventories were conducted on a transect basis regeneration and sapling densities were assessed on each plot. Anaerobic incubations were carried out to measure nitrogen fixation and substance respiration levels among different phases. The processes differed by phase and were sensitive to moisture and temperature regimes over the sampling season. Basal area and coarse woody debris volumes were statistically different from phase to phase.

DISCIPLINE: Botany

FIELDWORK LOCATION: Buffalo Narrows, Candle Lake, Northern Saskatchewan

98-016 TURKINGTON, J., et al. (1998). "The effects of NPK fertilization for nine years on boreal forest vegetation in northwestern Canada". Journal of Vegetation Science, 9:333-346.

ABSTRACT/DESCRIPTION:
Plant productivity is limited by mineral nutrient availability in many boreal forest ecosystems. This study is an analysis of the growth responses of components of a boreal plant community (cryptogams, herbaceous and woody perennials, the dominant shrubs *Salix glauca* (grey willow) and *Betula glandulosa* (bog birch) and the dominant tree *Picea glauca* (white spruce), to the addition of an NPK fertilizer over a nine-year period. The study was carried out in a low-nutrient boreal forest ecosystem in the Yukon territory in northwestern Canada. The following predictions were tested: (1) that there would be an overall increase in abundance (measured either as cover, density, or dry mass) of all components of the vegetation, (2) that vegetation composition would change as more competitive species increased in abundance, and (3) that initial community changes in response to fertilization would be transient. In general, all predictions were found to be true. Species composition changed rapidly in response to fertilizer. Graminoids (e.g. *Festuca altaica*) and some dicots (e.g. *Mertensia paniculata* and *Achillea millefolium*) increased in cover, while other dicots (e.g. *Anemone parviflora*), dwarf shrubs (e.g. *Arctostaphylos uvaursi*), bryophytes and lichens declined. There was a significant increase in the growth rate of the two dominant shrubs and of *Picea*, but not in the cone crop or seed production by *Picea*. Surveys after 1 or 2 years showed responses by the vegetation but more stable patterns of response did not emerge until after 5 or 6 years. There were consistent and directional changes in the percent cover of some of the herbaceous species on control plots. Growth rates of *Salix* and *Betula* varied considerably from year to year, independently of treatment. Long-term studies are essential if we are to understand the role of nutrient limitation in this ecosystem.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Kluane Lake, Yukon

98-017 ADAM, S., COLLINS, M., and PIETRONIRO, A. (1998). "RADARSAT Flood Mapping in the Peace-Athabasca Delta, Canada". Canadian Journal of Remote Sensing, July 1998, page 69.

ABSTRACT/DESCRIPTION:
Synthetic Aperture Radar imagery has proven very useful for mapping flooded areas due to the sensitivity of microwaves to liquid water. Spring flooding during May 1996 and May 1997 in the Peace-Athabasca Delta, Canada is successfully mapped using calibrated RADARSAT imagery. We have identified flood water distribution by segmenting the images into three distinct classes: open water flooded willow, and non-flooded areas. Supervised classification results of the original images are not acceptable due to the large local variance introduced by speckle. To improve the classification results we utilise image tone and texture. Initially, speckle is minimised with a 7x7 Gamma MAP (Maximum *A. Posteriori*) filter applied to each image. The resulting classification are significantly improved with a Kappa coefficient of over 90 percent. Textural information is further added to the classification, a coefficient of variation scene. With this additional information Kappa is slightly reduced, however, visual inspection shows that some channel and lake edges are more accurately classified as flooded willows. These areas represent vegetation transition zones and offer excellent habitat for water fowl. Although the three main classes have distinct textural and tonal signatures, mean properties (i.e. image tone) of the speckle reduced images are sufficient for an accurate classification.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Peace-Athabasca Delta, Northern Alberta

98-018 FROESE, D.G., SCHWEGER, C., and ENKIN, R.J. (1998). Sedimentology, paleomagnetism and paleoecology of a 1.5 Ma eastern Beringian loess record, Klondike area, Yukon. Presentation, Dust Aerosols, Loess Soils, and Global Change, Seattle WA, October 11-14, 1998.

ABSTRACT/DESCRIPTION:
Links between paleoclimatic information contained in ocean records and terrestrial environments have been best demonstrated with the development of extensive loess stratigraphies, over the last two decades. These records provide the most detailed and a near-continuous continental chronology available over timescale of hundreds of thousands of years and an important record of Quaternary climatic change. However, important regional variations in loess characteristics make their interpretation sometimes complex. A case study demonstrating the complexity of a long northern latitude loess and re-worked loess record

is presented from a new locale in the unglaciated area of the western Yukon, Canada. This study uses a combined approach including sedimentologic description, paleomagnetism and pollen analysis to characterize the record of paleoenvironmental change preserved in the Midnight Dome loess (MDL). The NML overlies an early Pleistocene terrace in the Klondike Valley, west of Dawson City in the central Yukon. Placer gold mining at the site in the late 1980s opened extensive pit walls allowing detailed sedimentologic description over 100s of metres and lateral facies relationships to be analyzed. The MDL is only the second site, (Gold Hill near Fairbanks being the other), in northwestern North America in which a long temporal record of loess deposition has been documented. Paleomagnetic sampling of the MDL reveals a Reverse-Normal-Reverse-Normal polarity sequence assigned to the late Matuyama and early Brunhes Chrons.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Klondike River Valley, Yukon

98-019 BARBER, J. (1998). Blood, Stone and Bone: Tradition and Innovation Among Young Inuit Carvers. Presentation, ICASS 111 - International Congress of Arctic Social Sciences (Third Conference), Copenhagen, Denmark, May 23, 1998.

ABSTRACT/DESCRIPTION:
Inuit sculpture is beholden to an intersection of Western and traditional influences. While young carvers strive to cultivate their own personal style, their work also responds to Western influences as well as Inuit traditions. Their work reflects the Western market for which it is created by way of recurring themes and popular subject matter that "sells". Aware of the demands of the southern market place, a major concern for the young artists is how their art will translate directly into economic independence. However, the subject matter itself usually relates back to Inuit traditions, lifestyle or the natural environment. Young artists not only learn about traditional stories and practices from their elders, but also learn the act of carving by watching the process. Often the subject matter or style of a young artist can be linked to that of their mentor (usually a parent or grandparent). Consequently, young Inuit carvers are emerging as an innovative new generation of Inuit sculptors who are creating a new genre of vibrant, unique art that caters to the demands of the Western market, while also reinforcing aspects of their traditional heritage.

DISCIPLINE: Sociology

FIELDWORK LOCATION: Cape Dorset, Clyde River, Nunavut

98-020 ALLARD, M. and KASPER, J.N. (1998). Temperature Conditions for Ice-wedge Cracking: Field Measurements from Salluit, Northern Québec. Presentation, 7th International Permafrost Conference, Yellowknife, N.W.T., June 23-27, 1998.

ABSTRACT/DESCRIPTION:
The temperatures at which thermal cracking occurred along ice-wedges around a tundra polygon were measured over two years near Salluit, northern Québec. Electrical cables were buried in the active layer across furrows or cracks in the soil at various places around the polygon. The time of breaking of the electrical cables, and the air, soil surface and ground temperatures down to 2.5 m were monitored with a data logger. In the course of the two winters, several cables broke with the opening of thermal cracks. Over the two years, the first cracks opened in late December-early January when the temperature at the permafrost table was about - 15°C, and after a drop of air temperature from about -20°C to below -32°C. Mean cracking temperature at wedge top was -20°C in the first year and -19.7°C in the second year. The data also allow estimates of the minimum temperature changes and cooling rates required to induce ice-wedge cracking. The cracks closed (or narrowed) and re-opened (or widened) in response to winter temperature fluctuations at the soil surface. The measured thermal conditions for cracking substantiate the previous theoretical work on this basic process at the origin of tundra polygons.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Foucault River, Northern Québec

98-021 BEAULIEU, N., MÉNARD, É, CARON, S. et al (1998). Coastal Changes along Manitounuk Strait, Hudson Bay, During the XIXth and XXth Centuries. Presentation, 28th Arctic Workshop, Boulder, CO, U.S.A., March 12-14, 1998.

ABSTRACT/DESCRIPTION:
Along the Hudson Bay coast, continuing and rapid isostatic uplift induces coastal progradation of shore sectors in bedrock and glacial deposits; however, the shoreline sectors in post-glacial Tyrrell Sea clays have receded by tens of meters over the last 49 years. This retreat, normally unexpected along emerging coastlines, has provoked important losses of coastal marshes. Regional, large scale mapping of the discontinuous permafrost shows that it is almost exclusively concentrated in the clay deposits along the shoreline where it can reach thicknesses up to 16 m. Between the permafrost patches, the fine sediments of the low coastal terrace are affected by deep seasonal frost. The tidal flat itself is also affected by deep seasonal frost (3-4 in deep) as the icefoot freezes to the bottom. The annual freezing induces the formation of ice lenses and of reticulated ice in those fine sediments. Both the

degradation of permafrost and the thaw of the seasonally frozen sediments are responsible for widespread slope wasting and thermo-erosion along the shoreline. Liquefaction and thaw weakening of the tidal flat sediments in early summer are relayed by wave erosion and transport by tidal currents. In fact, the clayey sectors of the coast evolve as an erosional platform and the shoreline actually retreats. A synthesis of our studies on coastal processes and regional permafrost history enables us to propose the following sequence for explaining the regional coastal dynamics : The permafrost aggraded rapidly under marshes from the years 1840 onward, as indicated by dendrochronology and by the computation of a mathematical model that simulates the growth of ice segregation mounds. At this time of documented cooler climatic conditions (Little Ice Age), the fast spatial expansion of permafrost patches and rapid frost heave (ca. 5 cm/a) locally added to isostatic uplift (ca. 1 cm/a) to accelerate the rate of coastal emergence and progradation. Conversely, permafrost degradation and increased freeze-thaw based erosion were responsible for localized retreat at a rate too fast to be balanced by isostatic uplift during the XXth Century warming. In the coming decades, the inexorable isostatic uplift will end up dominating the coastal evolution over any variation in climate induced geomorphological processes, and the tidal marshes should start to expand again along Manitounuk Strait.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Manitounuk Strait, Northern Québec

98-022 KINNARD, N. (1998). Analyse dendroclimatique en Jamésie au cours du XXe siècle par la radio-densitométrie. Thèse de Maîtrise, Faculté des Lettres, Université Laval.

RÉSUMÉ/DESCRIPTION :
La réponse de l'épinette noire (*Picea mariana* BSP) aux extrêmes climatiques en Jamésie a été étudiée par la densitométrie. Une typologie des cernes diagnostiques a été réalisée pour six stations, localisées entre la Baie de James et le réservoir Robert-Bourassa. Trois aspects ont été considérés en vue de vérifier l'hypothèse stipulant que la signature dendrochronologique est l'expression des extrêmes climatiques. Premièrement, les événements climatiques régionaux s'inscrivent dans les cernes de croissance des arbres. Tel est le cas pour les années 1956 le 1969 qui présentent le même type de cerne dans les six sites. Deuxièmement, le gradient climatique entre la baie et le réservoir s'exprime par un gradient des cernes diagnostiques. Troisièmement, les effets de la mise en eau du réservoir en 1979 se manifestent par la formation de cernes diagnostiques, spécifiques aux sites en marge de la nappe d'eau. La comparaison des séries de cernes diagnostiques avec des données climatiques disponibles depuis 1916 permet de caractériser la relation cerne - climat et de dater les événements climatiques extrêmes au cours des 150 dernières années.

DISCIPLINE : Sciences environnementales/écologie

LIEU DU TRAVAIL SUR LE TERRAIN : Réservoir Robert Bourassa, Nord du Québec

98-023 KINNARD, N. and BÉGIN, Y. (1998). A 150-year Dendroclimatic Reconstitution in the James Bay Region Using Tree-ring Densitometry. Presentation, 28th Arctic Workshop, Boulder, CO, U.S.A., March 12-14, 1998.

ABSTRACT/DESCRIPTION:
Dendrochronology is a method largely applied in the study of past climates. Cell width and density analysis permits to understand how climate affects plant growth. In the present work, three-ring densitometry is used to determine black spruce (*Picea mariana* BSP) response to climatic fluctuations in the James Bay area. A typology of event years has been made for six black spruce stands located between the bay and Robert-Bourassa reservoir. The site location illustrates the climatic gradient observed by Payette et Filion (1975) between the bay and the inland. Two of the stands are found in the reservoir. Three paths of analysis were considered in order to verify the hypothesis that tree-ring chronologies are in fact the expression of extreme climatic conditions. Firstly, tree rings record regional climatic events. As an example, the 1956 and 1969 tree rings present the same densitometric characteristics for all sites. They are actually light rings exposing a few latewood cell layers with limited wall thickening. These two years are said to be pointer years, conspicuous growth rings replicated in several series. Secondly, the climatic gradient is expressed by an east to west gradient in event years. In this regard, the year 1987 shows a high proportion of trees with dense earlywood cells but only for the stand near James Bay. As another example, the four eastern sites present a low latewood percentage in 1973. Finally, the presence of the reservoir (filled up in 1979) causes the formation of a few event years strictly near the water body. Moreover, after 1979, little event years are found in trees except for the far most western stand. Calibration of event year chronologies with available climatic data since 1915 brings out some relations between tree rings and climate. The associations are extended in the past leading to climatic reconstitution for the last 150 years in the James Bay region. The use of densitometry and event years in establishing regional dendroclimatic series constitutes a first in the field of dendroclimatology.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Réservoir Robert Bourassa, Northern Québec

98-024 LEPAGE, D., GAUTHIER, G. and DESROCHERS, A. (1998). "Larger clutch size increases fledgling success and offspring quality in a precocial species". Journal of Animal Ecology, 67:210-216.

ABSTRACT/DESCRIPTION:
We tested the hypothesis that the ability of parents to raise viable offspring limits clutch size

in the greater snow goose (*Anser cacridescens atle-inticus L.*). a precocial bird. We manipulated clutch size by exchanging complete clutches between pairs of nests to increase or decrease tile Clutch size by zero (control), one, two or three eggs in 3 14 nests over 2 years. Pre-fledgling survival of goslings increased in enlarged broods and decreased in reduced broods compared to control. Consequently, enlarged broods fledged more offspring and the reverse was true for reduced broods. Size and mass of goslings near fledgling was also higher in enlarged broods than in control, which suggests that offspring quality was also enhanced by the manipulation. This is contrary to the common trade-off between offspring numbers and quality. Larger families were dominant over smaller ones in feeding sites. Which could explain the increased survival and growth of enlarged broods. Our results suggest that the ability to raise young does not limit clutch size in this species and that parents could be more successful (i.e. increase both the number and quality of their offspring) by laying more eggs. However, the time required to lay additional eggs reduces the viability of all offspring and may explain why females do not lay more eggs.

DISCIPLINE: Biology

FIELDWORK LOCATION: Bylot Island, Nunavut

98-025 LEPAGE, D., GAUTHIER, G. and REED, A. (1998). "Seasonal variation in growth of greater snow goose goslings: the role of food supply". Oecologia, 114:226-235.

ABSTRACT/DESCRIPTION:
Even though growth rate is an important fitness component, it is still controversial to what extent parent birds adjust the timing of offspring hatch to natural variations in food supply to maximize offspring growth. We studied the role of food availability in explaining inter- and intra-seasonal variation of growth rate in goslings of greater snow geese over 5 years. The peak of hatching generally coincided with the peak of food availability. However, early-hatched goslings usually grew faster than birds hatched at the peak, which in turn grew faster than late-hatched goslings. although this phenomenon was not observed in all years. There was considerable variation in growth rate among the five years, the smallest goslings produced in the best year (1991) being larger than the largest goslings of the poorest year (1994). We developed three indices of food availability, based on the cumulative availability of plant biomass and nitrogen content during the growth period. and showed that the cumulative exposure to nitrogen biomass explained up to 43 percent of variation (intra- and inter-annual) in body size just before fledgling. In years with good feeding conditions, early-hatched goslings had access to more nitrogen during their growing period than those hatching on or after the peak and they grew faster. In years of lower food availability, early-hatched goslings had no detectable advantage over peak- or late-hatched birds for access to protein-rich food and no seasonal decline in growth rate was observed. These results confirm the critical role of food supply in the seasonal variation of growth rate in Arctic-nesting geese.

DISCIPLINE: Biology

FIELDWORK LOCATION: Bylot Island, Nunavut

98-026 LEPAGE, D., NETTLESHIP, D.N. and REED, A. (1998). "Birds of Bylot Island and Adjacent Baffin Island, Northwest Territories, Canada, 1979 to 1997". Arctic, 51(20):125-141.

ABSTRACT/DESCRIPTION:
Observations of birds in the Bylot Island region from 1979 to 1997,with emphasis on the south west part of the island each summer since 1989, revealed an avifauna composed of 63 species, of which 35 were breeding. Thirteen species are new records for the region, including one for the Northwest Territories (black-headed gull *Larus ridibundus*) and for the Canadian Arctic Archipelago (killdeer *Charadrius vociferits*; mew gull *Larits canits*). Two species, Canada goose (*Brania canadensis*) and red knot *(Calidris canutus*), were also confirmed as breeders for the first time in the region. A summary of these avifaunal observations, along with a review of previous observations made in the region, allows changes in population size and status of individual species to be identified. These records combined with those from earlier studies give a total of 74 species for the Bylot Island region, 45 confirmed as breeders. This makes the avian community in the area one of the most diverse known north of 70°N latitude in the Canadian Arctic Archipelago.

DISCIPLINE: Biology

FIELDWORK LOCATION: Bylot Island, Nunavut

98-027 LESAGE, L. and GAUTHIER, G. (1998). "Effect of Hatching Date on Body and Organ Development in Greater Snow Goose Goslings". The Condor, 100:316-325.

ABSTRACT/DESCRIPTION:
Growth rate in geese is sensitive to the feeding conditions during the brood-rearing period, and late-hatched goslings, grew at a lower rate than early-hatched one. We examine how the seasonal decline in food supply affected the development of body components of late-hatched and early-hatched goslings in male and female Greater Snow Geese. We collected and autopsied 48 early-hatched (EH, mean age at capture = 42.4 days and 48 late-hatched goslings (LH, mean age = 34.8 days), divided equally among sexes, near fledgling at four different sites on Bylot Island, Northwest Territories. After statistically adjusting for differences in body size between the two groups, EH goslings had more body protein than LH ones. However, the development of all organs was not affected equally. The mass of most supplying organs (the food acquisition apparatus: legs, esophagus, intestine, and liver), which develop early during growth, was similar between EH and LH goslings. In contrast,

LH goslings had much smaller breast muscles than EH goslings, even after adjusting for size differences. Body fat was very low and similar in both groups. Body mass, body protein, intestine, and breast muscles showed a sexual dimorphism favoring males in EH, but not in LH, goslings. These results show that poor feeding conditions encountered by LH goslings disproportionately affected late-developing organs compared to early-developing ones, and males compared to females. Differences in organ development could reflect an adaptive response to reduced food availability. Prioritizing the development of supplying organs at the expense of other organs when food availability is low could help goslings maintain a high nutrient intake.

DISCIPLINE: Biology

FIELDWORK LOCATION: Bylot Island, Nunavut

98-028 MÉNARD, É., MICHAUD, Y. and ALLARD, M. (1998). Monitoring of ground surface temperatures in various biophysical micro-environments near Umiujaq, Eastern Hudson Bay, Canada. Presentation, 7th International Permafrost Conference, Yellowknife, N.W.T., June 23-27, 1998.

ABSTRACT/DESCRIPTION:
We measured ground surface temperature (1995-1996) on a number of land types representative of all the terrain conditions encountered in a study area in order to establish interpretation keys for permafrost regional mapping. Continuous soil surface temperature data were obtained using 15 micro-dataloggers set 5 cm deep in various biophysical micro-environments located in the Umiujaq area, on the eastern shore of Hudson Bay. Analysis of the mean temperatures and the ratio between the freezing and thawing indexes, combined with the cumulative degree-day curves and the frost and thaw penetration curves, allowed us to predict the existence of permafrost at 7 of the 15 sites monitored. Sites affected by permafrost are located only under low vegetation stands, independent of surfacial deposit types. Except at some herbaceous sites, the minimum annual snow depth needed to prevent permafrost development in the study area is about 50 cm.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Umiujaq, Northern Québec

98-029 MORNEAU, C. and PAYETTE, S. (1998). "A dendroecological method to evaluate past caribou (*Rangifer tarandus L.*) activity". Ecoscience, 5(1):64-76.

ABSTRACT/DESCRIPTION:
Records of population changes of caribou come from various sources (historical accounts,

hunting and trading statistics, herd surveys) that are typically incomplete and discontinuous in time and space. Here we propose a new method for the evaluation of past caribou activity using tree-ring records from boreal and subarctic conifer stands. The age-frequency distributions of trampling scars produced by caribou hooves on surficial roots and low branches of erect and stunted conifers are used as art index of the passage of caribou, through stands during the snow-free period. To verify if changes in the age structure of trampling scars correspond to changes in abundance of caribou movement, we analyzed factors influencing production and loss of scars at two lichen-woodland sites in northeastern Québec-Labrador (Canada). The detailed analysis of trampling scars in the first site indicates that the capacity of conifers to produce, scars is maintained under it regime of repeated caribou traffic; scars, were formed at new position along the exposed roots and scars continued to he produced at a same position in a minimum time of one growing season, even after 15 years of caribou traffic. The influence of repeated caribou trampling on loss of scars was measured by comparing the age structure of scars of three vegetation groups (based on caribou trail network) with different intensities of use. The similarity of the age-structures of the three groups showed that scar loss due to trampling was hardly detectable, which indicated that scar loss was low in comparison to the number of scars produced, even in the most used trails. Sampling of trampling scars during two successive years at the second site, showed that the stability of the age structure of scars was not affected by moderate caribou traffic. Our results, therefore, indicate that most of the information deduced from the age structure of trampling scars comes from changes in caribou activity. The method opens the possibility of assessing caribou activity in time (several decades) and space over large areas of the boreal forest and the forest-tundra biomes.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Kangiqsualujjuaq, Northern Québec

98-030 PEREG, D. and PAYETTE, S. (1998). "Development of black spruce growth forms at treeline". Plant Ecology, 138:137-147.

ABSTRACT/DESCRIPTION:
Most treeline populations in northeastern Canada are monospecific stands of black spruce (*Picea mariana* B.S.P.), a hardy, cold-tolerant species able to withstand harsh climatic conditions under different growth forms in the forest tundra. Black spruce thrives in protected areas and exhibits a normal arborescent growth form, but in exposed sites, upright stems are damaged above the snowbank by snow abrasion and wind. In this study, the development of damaged growth forms was examined in a moderately exposed habitat. Five developmental stages were identified and described using detailed stem analysis of 13 spruce trees. Four different types of damaged growth forms were identified according to variations in supra-nival (above snow) stem height and number. At tile site scale, the age structure of supra-nival shoots, based on a larger sample of 256 stems, was unimodal, suggesting a

synchronous development of the spruce stand in which 46 percent of the shoots were initiated during the 1960s and 1970s. Subfossil trunks on tile ground were all depressed trees, indicating that the former vegetation was a krummholz, not a forest. This indicates the recent development of the small-tree stand above the snowbank, probably triggered by recent milder conditions associated with snowier winters in the last decades.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Boniface River, Northern Québec

98-031 RINGUETTE, M., FORTIER, L., RUNGE, J.A. et LEGENDRE, L. (1998). Egg production by large calanoid copepods from April to July in the North Water Polynya. Affiche, Gordon Research Conference, Ventura, CA, U.S.A., 7 mars 1998.

RÉSUMÉ/DESCRIPTION :
L'hypothèse centrale du projet International d'étude de la Polynie des Eaux du Nord (NOW) propose que la succession dans le temps des processus de chaleur sensible le long de la côte du Groenland et de chaleur latente le long de la côte canadienne soit responsable de l'ouverture hâtive et de la productivité élevée de la Polynie des Eaux du Nord. De ce fait, la reproduction des copépodes *Galanofdes* suivraient un gradient Est-Ouest. La distribution spatiotemporelle de la biomasse de chlorophylle et le taux de production d'oeufs des principales espèces de copépodes *(Calanus hyperboreus, C. glacialis, C. finmarchicus* et *Metridia longa)* sont présentés et discutés.

DISCIPLINE: Océanographie

LIEU DU TRAVAIL SUR LE TERRAIN : Mer de Baffin

98-032 SARRAZIN, D. and ALLARD, M. (1998). Analysis of Some Permafrost Features Through Cryostratigraphy and Ground Penetrating Radar (G.P.R.) Investigations on an Emerging Coast, Nastapoka River, Subarctic Québec. Presentation, 7th International Permafrost Conference, Yellowknife, N.W.T., June 23-27, 1998.

ABSTRACT/DESCRIPTION:
Ground penetrating radar (G.P.R.), a recent geophysical method similar to seismic reflection and sonar, was used to characterize permafrost cryostratigaphy in coastal and marine sediments. The nature and properties of these fine materials have allowed abundant ice to accumulate in the ground and different geomorphological processes to occur. This study was concentrated on cryogenic mounds, permafrost plateaus and polygon fields in the coastal zones located on both sides of the Nastapoka river. The abundance of permafrost and high concentrations of ice in the coastal zone are in part attributable to the harsher climatic

conditions associated with the presence of the Hudson Bay. G.P.R. profiling was undertaken at several sites in order to define the lateral and vertical distribution of ground ice. For this purpose, an analysis of the electromagnetic signatures from different permafrost features was conducted. Topographic corrections were applied to the profiles as well as spatial and temporal filters and gains in order to obtain a better resolution of the electromagnetic signatures. Boreholes, down to 3 m in depth, located on the same transects as the G.P.R. profiles allowed validation of the G.P.R. data. The cores obtained were logged for estimated ice content, ice characteristics and distribution, and soil type. This cryostratigraphic analysis of the permafrost features gave information on type, quantity and distribution of ground ice as well as on the nature of sediments. These elements are important in the delineation and mapping of permafrost and geomorphological features.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Nastapoka River, Northern Québec

98-033 TREMBLAY, M. (1998). Analyse densitométrique des cernes de croissance de l'épinette noire en milieu insulaire, par suite de la création du réservoir Robert-Bourassa (LG-2) en Jamésie, Québec nordique. Thèse de Maîtrise, Faculté des études supérieures, Université Laval.

RÉSUMÉ/DESCRIPTION :

L'analyse dendrochronologique de la réponse climatique de 1'épinette noire en milieu insulaire a permis d'évaluer l'effet de la mise en eau du réservoir Robert-Bourassa sur la végétation insulaire. L'analyse des anomalies de croissance (bois de réaction, cernes de gel, cernes pâles et canaux résinifères traumatiques), de la croissance radiale et de la densité des cernes annuels met en évidence l'appariti ond'une enclave climatique en milieu insulaire suite la création du réservoir Robert-Bourassa à l'hiver 1978-1979. Depuis la mise en eau du bassin, la végétation insulaire semble être d'avantage exposée à des conditions climatiques rigoureuses. La végétation des îles de faibles diamètres et de fables altitudes serait négativement influencée par des conditions climatiques maintenant plus froides et plus venteuses que dans le passé, ainsi que par un retard de la saison de croissance par rapport à la période végétative habituelle.

DISCIPLINE : Sciences environnementales/écologie

LIEU DU TRAVAIL SUR LE TERRAIN : Réservoir Robert Bourassa, Nord du Québec

98-034 MUNDY, C.J. (1998). Sea Ice Flux Within the North Water Region. Presentation, Northern Studies Seminar, St.Paul's College, Winnipeg, Manitoba, November 20, 1998.

ABSTRACT/DESCRIPTION:
Sea ice is a major component of the Arctic marine ecosystem. An ice cover significantly modifies the ocean-atmosphere exchange of mass, energy and momentum with both direct and indirect consequences on primary production. Polynyas are important zones of biological activity and have been hypothesized as a carbon sink. However, within a polynya sea ice conditions can change dramatically throughout any given year and between years. The variation in ice cover is a consequence of the complex mechanisms that act to form and maintain the polynya, and include any combination of latent and sensible heat processes. This work is based on the hypothesis that the sea ice flux may be indicative of the type and/or contribution of mechanisms working to form and maintain a polynya. With the advent of space-borne remote sensing platforms, particularly synthetic aperture radar (SAR), we are now able to monitor the surface at spatial and temporal scales amenable to the study of physical and biological processes. This work will examine the sea ice flux within the North Water region in relation to the two polynya formation and maintenance mechanisms. Furthermore, a connection will be made between the sea ice flux and primary production through a mutual association with stratification of the underlying water column.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: North Water Region, Resolute, Nunavut

98-035 YACKEL, J.J., BARBER, D.G. and SHOKN, M.H. (1998). On the estimation of the thermodynamic and mechanical state of landfast first-year sea ice using Synthetic Aperture Radar (SAR) data. Presentation, Northern Studies Seminar, St.Paul's College, Winnipeg, Manitoba, November 20, 1998.

ABSTRACT/DESCRIPTION:
The seasonally dynamic thermodynamic nature of sea ice is evaluated using *in situ* and time series Synthetic Aperture Radar (SAR) data. This work is of scientific and operational interest because of its potential use in sea ice ablation forecasting and ship navigation. The principal coupling in this relationship reveals that as the temperature of the snow/ice system increases there is an associated increase in brine volume. This causes a decrease in ice strength and a corresponding increase in the complex dielectric constant (e*) of the near surface volume which is then detected as a change in the microwave scattering coefficient (s). We evaluate this relationship towards ice strength estimation using data collected during the 1993, 1994 and 1995 Seasonal Ice Modelling and Monitoring Site (SIMMS) and 1997

Collaborative-Interdisciplinary Cryospheric Experiment (C-ICE). Field programs near Resolute Bay, N.W.T. Results indicate the time series (s) may serve as a proxy indicator of the thermodynamic and mechanical state of smooth land fast first-year sea ice. We demonstrate a thermodynamic dielectric-scattering relationship to exist for smooth first year sea ice types only and that ice surface temperature consistently accounts for more of the variation in (s) than does air temperature. C-ICE'97 data show a significant reduction in first year sea ice strength occurred between Julian Days 175 to 183 (significantly earlier than observed ice break-up, Days 209 to 213). This period of ice strength reduction coincided with the initial stages of melt pond formation a rapid increase in ice temperature and ice brine volume, and an increase in microwave scattering following a minimum in (s) observed during the funicular stage of the Melt Onset regime.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Resolute Bay, Nunavut

98-036 **BOUCHER, S. (1998).** "Origins and zoogeography of flies (Insecta: Diptera) in southern Yukon Grasslands". Arctic, 51(4):399-411.

ABSTRACT/DESCRIPTION:
The purpose of zoogeographic analysis is to answer the question: "What lives where, and why?" The question may be simple, but the answer often requires input from systematics, ecology, geology, climatology, paleoecology and other disciplines. Of 41 the non-biological factors, glaciation is the single most important in determining the present distribution of the Canadian biota. During the Wisconsinan glaciation, almost all of Canada was covered with ice sheets, but some areas remained ice-free, acting as refugia for many plants and animals. The best-known and best-supported refugium in the north is Beringia, which extended from eastern Siberia across the Bering and Chukchi Seas to Alaska and the Yukon. After the Wisconsinan, the Beringian. flora and fauna were again connected with the rest of North America, and the newly deglaciated area was colonized from both directions. Although thereafter not common, some animals still show a Beringian, distribution, they have not expanded their range since the last glaciation. Beringia performed three roles that are significant in zoogeography: it acted as a refugium for many existing Neoarctic species; it was a route for the immigration of Palaearctic species to North America; and it was an area of isolation where new species could evolve, Because of its glacial history, the Yukon Territory is of great interest for biologists, and it is no secret that the region has a unique insect fauna. Most people who collect insects in the Yukon are attracted by the "typical" habitats of Beringia-the tundra, the mountain slopes, the extensive wetlands, rivers, and lakes. but there are many smaller, unusual, and often overlooked habitats in the Yukon with their own particular insect fauna.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Northern Québec

98-037 **COUTURE, N. and POLLARD, W. (1998).** An assessment of ground ice volume near Eureka, Northwest Territories. Conference Proceedings, International Permafrost Conference, Yellowknife, N.W.T., June 1998.

ABSTRACT/DESCRIPTION:
Ground ice comprises a significant fraction of surficial materials in the area surrounding Eureka, Northwest Territories. Its total volume was determined to range from approximately 8.3 to 37.1 percent, depending on the depth of the terrain unit used for the estimate. Of this ice, 24 to 37 percent is estimated to be excess ice, which controls the response of a permafrost terrain to disturbance. This study combines data from a number of sources to

arrive at its assessment. Information is taken from previous studies which examined specific occurrences of various types of ground ice (i.e., segregated ice, ice wedge, ice or pore ice) in the Eureka area, either in natural exposures or in cores from shallow drilling activities. The distribution of each ice type is extrapolated to a wider area by examining the evidence of its surface morphological expression on air photographs. Additionally, the association of the ice with various sediments is noted, and surface geological data is used to infer where and in what quantities ground ice occurs. This data is supplemented by ground measurements. The specific observations of ground ice are converted to a percentage of soil volume by using estimation methods which were developed for other regions, and calibrating them for use in the Eureka area.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Eureka, Nunavut

98-038 POLLARD, W., OMELON, C., ANDERSEN, D. and MACKAY, C. (1998). Geomorphic and Hydrologic Characteristics of Perennial Springs on Axel Heiberg Island, N.W.T. Conference Proceedings, International Permafrost Conference, Yellowknife, N.W.T., June 1998.

ABSTRACT/DESCRIPTION:
This paper documents the hydrologic and geomorphic characteristics of perennial springs on western Axel Heiberg Island in the Canadian High Arctic. Several mineralized springs occur near the McGill Field Station at Expedition Fiord. One group with roughly 40 outlets is located 3 km from the terminus of the White and Thompson Glaciers discharging at the base of the east side of Gypsum Hill adjacent to the flood plain of the Expedition River. A second group is located at Colour Peak near the head of Expedition Fiord, approximately 10 km down valley from the first group. Spring discharge varies considerably amongst the 40-60 outlets from seeps where flow is < 0.5 1/s to pipes where flow is nearly 1.5 1/s. Spring vents are spread over several hundred square metres. Discharge temperatures vary from -2 C to +6 C. The mineralized nature of the discharge is responsible for a range of precipitates and travertine deposits. This paper documents spring discharge, water chemistry, and mineral precipitates associated with the springs.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Axel Heiberg Island, Nunavut

98-039 CAREY, S.K. and WOO, M.-K (1998). The effect of frost on the water balance of two subarctic slopes. Presentation, Canadian Geophysical Union, Québec, Québec, May 18, 1998.

ABSTRACT/DESCRIPTION:

The water balance of slopes in a discontinuous permafrost environment was studied in the Wolf Creek Basin, Yukon. The sites include a South-facing slope with a dense aspen forest underlain by silt soils with seasonal frost and a North-facing slope with open stands of spruce and an organic layer that rests atop mineral soils with permafrost. Precipitation inputs were similar on both slopes, though the North slope had over 30 percent more snow at the end of winter. During snowmelt, the seasonally frozen soils of the South slope did not hinder infiltration and the soil profile was recharged but no surface runoff was generated. On the North slope, ground ice restricted infiltration of meltwater and about 80 percent of the snow storage was discharged as surface runoff. As ground thaw progressed, surface runoff declined. After the thawing front advanced beneath the organic layer, two modes of flow occurred: 1. quick flow at the base of the organic mat and 2. slower Darcian flow in the mineral soil. On the South slope, soil moisture was mostly depleted by evaporation, the magnitude of which about equalled precipitation. During snowmelt on the North slope, large surface detention of meltwater supported high evaporation rates. As the frost table descended, near-surface soil moisture declined, accompanied by a reduction in evaporation rates. Seasonally, evaporation was slightly larger than total precipitation. For the period of August 1996 to August 1997, the moisture storage changes were about +5 percent for both slopes. These field results indicate that seasonal frost not accompanied by large percentages of ice content does not hinder downward movement of water into the mineral soils. This promotes vertical exchange of water at the expense of lateral runoff. Conversely, permafrost with ice rich layers inhibits infiltration and percolation of water, confining the soil water within the surface thawed zone and promoting surface runoff and lateral subsurface drainage. Knowledge of permafrost disposition within subarctic basins is therefore critical in determining the contributing source areas for streamflow and basin water balances as a whole.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Whitehorse, Yukon

98-040 CAREY, S.K. and WOO, M.-K. (1998). "Snowmelt Hydrology of Two Subarctic Slopes Southern Yukon, Canada". Nordic Hydrology, 29(4-5).

ABSTRACT/DESCRIPTION:

Large quantities of water are discharged from subarctic basins during snowmelt season. Runoff contributing areas as well as timing and magnitude of meltwater generation from different slopes are highly variable. Two slopes in the lower Wolf Creek basin, southern Yukon, were studied in 1997. The south-facing slope has a dense aspen forest that is leafless in the melt period (April - May) and was underlain by seasonal frost. The north-facing slope has open stands of spruce and an organic layer that rests on mineral soils with permafrost. In 1997, snowmelt is advanced by over 10 days on the south slope, which receives more solar radiation than the north aspect. All meltwater on the south slope infiltrates the frozen silt without generating runoff. By the time significant melt events occur on the north slope, the frost and snow are gone from the south. Meltwater is able to infiltrate the frozen organic soil but deep percolation is prevented by the ice-rich substrate. Lateral flow begins after the organic layer is saturated, with much runoff along intermittent rills fed by diffuse and pipe flows. Rills and pipes are interconnected but the drainage network and runoff contributing area change depending on the disposition of the snow as well as water and frost table positions relative to local topography. Contrasts between the north and south slopes have important implications on direct runoff generation during the melt period. Situations similar to the study site can be found elsewhere in subarctic North America and the observed processes have a bearing upon hydrological modelling for the subarctic environment.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Whitehorse, Yukon

98-041 **ADAMS, P. (1998).** Activity budgets of moulting Harlequin Ducks at the Gannet Islands, Labrador. Presentation, ACWERN Annual Meeting, St. John's, NF, October 30, 1998.

ABSTRACT/DESCRIPTION:
Activity budgets of Harlequin ducks were studied during the summer (July and August) at the Gannet Islands, Labrador. The study was designed to determine the percentage of time spent feeding during the different stages of their moult. The Harlequins were observed with the use of a spotting scope from various locations within the Gannet Clusters. During each focal sample individual ducks were observed for a total of five minutes with activities recorded at fifteen second intervals. The stage of moult of each male Harlequin was determined through a close examination of their plumage. Later in the summer, stages of wing moult were also determined for both males and females. The total population of Harlequins at each observation area was also determined during each focal sample. Weekly Harlequin surveys were carried out by boat to determine the total population of Harlequins at the Gannet Islands. It was determined that approximately 120 125 Harlequins were moulting there during the study period. Also during this study Harlequins previously banded in Maine (in winter) and in northern Labrador (in summer) were resighted.

DISCIPLINE: Biology

FIELDWORK LOCATION: Gannet Islands, Labrador

98-042 **BAILLIE, S. (1998).** Parental provisioning and breeding performance of Atlantic Puffins at the Gannet Islands, Labrador. Presentation, ACWERN Annual Meeting, St.John's, Newfoundland, October 30, 1998.

ABSTRACT/DESCRIPTION:
Due to a capelin stock crash in Labrador in the early 1990s, breeding seabirds in the region have exhibited evidence of food stress. Despite increasing capelin biomass in puffin chick diet at the Gannet Islands over the past three years (3percent to 26 percent biomass), present use of capelin remains lower than historical records (75 to 80 percent biomass). In this part of my study, I plan to show impacts of food stress by comparing diet composition in relation to prey availability, breeding productivity and linear phase chick growth among years 1996, 1997 and 1998. My late 1990s study will be contrasted with those conducted in the early 1980s at the Gannets when Capelin were abundant.

DISCIPLINE: Biology

FIELDWORK LOCATION: Gannet Islands, Labrador

98-043 ROWE, S. and JONES, I.L. (1998). The enigma of Razorbill *Alca torda* breeding site selection: Adaptation to a variable environment? Presentation, ACWERN Annual Meeting, St.John's, Newfoundland, October 30, 1998.

ABSTRACT/DESCRIPTION:
We investigated habitat choice in the Razorbill, which is unusual anong seabirds because it uses exposed ledges, enclosed crevices, and even burrows for breeding. Foxes inflicted intense predation upon crevice nesting Razorbills (and other ground nesting birds) at the Gannet Islands, Labrador between the late 1980's and 1995. Currently, foxes are absent and the gull population appears to be increasing. We found no difference between ledges and crevices in egg size, laying date, breeding success, or the likelihood of use as a new site. Experimental evidence indicated that unlike crevice sites, ledges were vulnerable to gulls. Razorbills use of various nest types may result from alternating episodes of intense terrestrial predation, followed by intense avian predation. Use of two different nest types may be maintained because when foxes are present, crevice nesting birds are selected against while in the presence of avian predators (and in the absence of foxes) there is a selection against ledge nesting Razorbills.

DISCIPLINE: Biology

FIELDWORK LOCATION: Gannet Islands, Labrador

98-044 **GIUGNI, L.-P., GRAY, J.T. et CAVAYAS, F. (1998).** "Utilisation de la télédétection pour la cartographie des dépôts glaciaires sur l'île Akpatok, Baie d'Ungava, T.N.-O." Journal canadien de télédétection, 24(4):402-414.

RÉSUMÉ/DESCRIPTION :
Dans le cadre de la reconstitution des derniers mouvements de l'Inlandsis laurentidien, la localisation de l'île Akpatok, près de la confluence de deux exutoires importants de langues glaciaires - la baie d'Ungava et le détroit d'Hudson, nous est apparue stratégique. Nous croyons qu'elle est susceptible de devenir les empreintes permettant d'expliquer l'évolution des masses de glace au Wisconsinien supérieur dans la baie d'Ungava. La répartition des dépôts meubles glacio-génétiques autochtones et allochtones sur l'île Akpatok est un des éléments qui aidera la comprehension de l'évolution glaciaire. Cet article propose une méthode de reconnaissance de tels dépôts par télédétection, complémentaire aux approches géomorphologiques traditionnelles. Cette méthode est basée sur la corrélation positive entre la végétation et l'abondance du matériel clastique d'origine cristalline et métasédimentaire transporté du Bouclier canadien par des langues glaciaires et abandonné comme du matériel erratique sur cette île formée uniquement de calcaire paléozoïque. A partir d'un quart de scène Landsat-5 TM d'août 1988 et d'une trentaine de sites d'entraînement récoltés en 1993 et 1994, nous avons élaboré une classification permettant de faire ressortir cinq types de surfaces: glaciaire, marine, alluviale ou colluviale récentes, organique et hydrique (l'eau et la neige). L'utilisation d'un indice de végétation ainsi que d'un modèle numérique d'élévation nous a permis d'estimer pour les surfaces glaciaires, l'abondance relative du matériel erratique. La précision sur le terrain d'une telle estimation, mesurée à partir de 88 sites d'échantillonnage, est de 79 pour cent, ce qui est très acceptable pour ce type d'application. De plus, une analyse concluante de la géochimie des tills effectuée pour 9 sites confirme notre hypothèse. Nous croyons que cette méthode d'analyse pourra être exploitée pour l'étude d'autres régions éloignées de l'Arctique où les contrastes lithologiques se traduisent dans le couvert végétal.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : île Akpatok, Baie d'Ungava, T.N.-O.

98-045 CABANA, Y. (1998). Étude comparative par analyse chronologique et sédimentologique d'accumulations éoliennes à la fin du Pléistocène supérieur et à l'Holocène dans le nord-ouest du Yukon. Thèse de Maîtrise, Faculté des études supérieures et de la recherche, Université d'Ottawa.

RÉSUMÉ/DESCRIPTION :
Cette étude recouvre la période de la fin du Pléistocène supérieur et l'Holocène. Elle met en relief, par analyse comparative, les influences locales et régionales que subissent des accumulations éoliennes selon les conditions paléoenvironnementales et paléoclimatiques de l'époque. L'étude porte sur les loess de Bluefish datant de la fin du Pléistocène, des accumulations éoliennes de sommet de falaise, d'âge holocène, dans la vallée de la rivière Porcupine et des sédiments éoliens de la plaine alluviale de la rivière Bluefish, de l'Holocène moyen. Les analyses chronologiques et sédimentologiques, telles la granulométrie et la géochimie des sédiments permettent de constater que l'édification de phénomènes éoliens locaux peuvent être conséquents de phénomènes d'envergure régionale et renferment ainsi des informations relatives à des changements d'ordre paléoclimatique et paléoenvironnemental.

DISCIPLINE : Géographie physique

LIEU DU TRAVAIL SUR LE TERRAIN : Old Crow, Bear Cave, Rivière Porcupine, Yukon

98-046 CLARKE, S.A. and LEWKOWICZ, A.G. (1998). Influence of climate fluctuations on solifluction: An experimental study. Conference Abstract, 7th International Permafrost Conference, Yellowknife, N.W.T., June 1998.

ABSTRACT/DESCRIPTION:
Solifluction is one of the most important mass movement processes within the active layer in permafrost environments. Given an incomplete understanding of the relationship between solifluction rates and climate, it is difficult to effectively predict future rate changes as a result of climate fluctuations. The objective of this experiment was to simulate climate change and to directly examine the effect on solifluction. The experimental site is located in continuous permafrost in the valley of Hot Weather Creek on the Fosheim Peninsula, Ellesmere Island. Five electro-mechanical metres anchored in permafrost and thermocouple cables were installed close together on a planar portion of an 80 colluvial slope in 1992-93. The meters and cables were multiplexed to a data logger which acquired ground temperature and soil movement data continuously from August 1993 until August 1997. The soil at the site consists of a sandy silt (clay < 8 percent) with a liquid limit of 29 percent and a plasticity

index of 12 percent. During the summer of 1996, one meter was warmed using polyethylene (B), one wetted by manual watering of the slope (D), one treated to a combination of these treatments (A), one cooled by shading (E) and the last left as a control (C). The climatic treatments were successful in manipulating active layer conditions in 1996, as maximum thaw depths ranged from 72 cm at meter A to 54 cm at meter E. The control meter (C) thawed to a depth of 64 cm. The increase in thaw depth had an impact on movement throughout the soil profile. Between January 1, 1996 and January 1, 1997, the blocks at Meter A indicated the greatest amount of downslope movement. The maximum amount of movement recorded, 34 mm, was at a depth of 26 cm, while movement at the other meters ranged between 12 and 16 mm at the same depth. Very little movement was measured at 66 cm (2 to 7 mm) at meters B, C and D, whereas meter A indicated 22 mm. Measurements of meter height above the ground surface suggest that much of meter A's movement may have occurred as a result of soil settlement, as the increased thaw depth allowed for the melting of an ice-rich zone. Between June 26 and August 9, soil surrounding meter A settled approximately 58 mm, whereas that surrounding meter E heaved approximately 10 mm.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

98-047 CLARKE, S.A. (1998). An experimental study on the influence of climatic fluctuations on solifluction, Fosheim Peninsula, Ellesmere Island, Nunavut. M.A. Thesis, Graduate Studies and Research, University of Ottawa.

ABSTRACT/DESCRIPTION:

A field experiment, involving direct manipulation of surface microclimate, was undertaken in the continuous permafrost zone to examine the influence of climatic fluctuations on solifluction rates and movements throughout the active layer. Movements and soil temperature were measured continuously from 1993-1997 using five electro-mechanical meters and thermocouple cables on an 8' colluvial slope in Hot Weather Creek valley, Ellesmere Island. Natural variation of movement among the years and the meters was measured until summer of 1996 when surface climatic treatments (surface warming, wetting, a combination of these two, and cooling) were performed. The longer term effects of the treatments were monitored until August 1997.→/← In the dry environment of the Fosheim Peninsula, moisture is the primary controlling factor on amounts of solifluction, with air temperature influencing moisture availability and distribution within the soil, and ice lens formation. Near-surface measurements alone do not provide an accurate picture of solifluction in areas with two-sided freezing ("cold" permafrost) because there can be substantial variation in movement rates at depth. In addition, multi-year average rates potentially hide a considerable range of annual variability and do not allow for the examination of a relationship between climatic fluctuations and annual movement. In particular, the sequence in which warm, cool, wet and dry years occur influences the

distribution of moisture within the active layer and the depth of thaw, and as a result, the total movement. Further study of the link between current climate and movements in areas of two-sided freezing is required to assist in palaeoclimatic reconstructions based on solifluction movements.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

98-048 GAJEWSKI, K. and LACOURSE, T. (1998). Palaeoenvironment reconstruction in the southwest Yukon: Potential for fine resolution studies over the last 1000 years. Presentation, Wolf Creek Research Basin Workshop, Whitehorse, Yukon, March 1998.

ABSTRACT/DESCRIPTION:
Sediments from different lake environments in the Kluane Region are being analysed for a multiparameter approach to palaeoenvironment reconstruction, 4 - 5m cores dating from deglaciation of the region provide the opportunity for high resolution studies and offer the possibility of studies of climate variability by comparison with lacustrine records in the Whitehorse area. Initial results from pollen analysis demonstrate conformation with other studies in the region. Geochemical and stratigraphic analysis together with initial analysis of molluscs indicate variability of lacustrine conditions throughout the Holocene.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Kluane Lake, Whitehorse, Yukon

98-049 GAJEWSKI, K., JOHNSON, P.G. and LACOURSE, T. (1998). Paleoenvironmental reconstruction in the southwest Yukon Territory, Canada. Presentation, Arctic Forum, Arctic Research Consortium of the United States, Annual Meeting, Washington, D.C., U.S.A, March 1998.

ABSTRACT/DESCRIPTION:
In the Kluane Region of the southwest Yukon there are lakes with sedimentary records which range from organic accumulations to carbonate deposition to clastic deposition. These occur in open system basins with well developed surface inflow and outflow, in closed basins with groundwater control, and in lakes supplied from glacierized regions. Deglaciation of the area occurred, according to currently accepted ideas, about 12,500 yrs BP. Bulk carbonates dates, which are problematic, suggest that the retreat of the ice may have been earlier. The sediment stratigraphic and pollen records indicate that there has been uninterrupted sedimentation through the Holocene. Within the stratigraphy the White River Volcanic Ash dated at 1147

BP provides an excellent recent marker horizon but no other stratigraphic correlations have been established between lakes. The paleoenvironmental data in the sediments is providing a detailed proxy record of change through the Holocene. The palynological record from Sulphur Lake conforms with the trends indicated from other studies in the region with an early grassland tundra being replaced with a *Betula* and *Pinus* community before the invasion of *Picea* about 8,500 yrs BP. Additional data from chironomids, ostracods, macrofossils and charcoal is contained in the sediments. In the carbonate Jenny, Emerald and Keyhole Lakes two species of Pea Clams are present through the record and the high degree of preservation will permit a detailed reconstruction of the lacustrine conditions. The population of the pea clams varies markedly through the sediment which is thought to indicate temperature fluctuations of the lake. The sediments also contain a detailed record of input of eolian sediment. The presence of small quantities of magnetite from the loess gives a definite magnetic susceptibility signal on the background of the carbonate sediments. The carbonates have a signal which is zero to slightly negative and experiments have shown that even a 5 percent by weight loess composition produces a recognisable magnetic susceptibility peak. Variations between cores probably represents variability during depositional events but there is evidence for loess contribution throughout the Holocene. Glacier fed lakes contain a proxy hydrological record in the clastic sediments which indicate considerable variability through time.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Kluane Region, Yukon

98-050 KOKELJ, S.V. (1998). The effect of detachment sliding on surface wash erosion in the continuous permafrost zone, Hot Weather Creek, Fosheim Peninsula, N.W.T. M.A.Thesis, Department of Geography, Graduate Studies and Research, University of Ottawa.

ABSTRACT/DESCRIPTION:

An experimental design was developed to evaluate the effect of active-layer detachment sliding on surface wash erosion. Specifically, the aim was to examine to what extent the disturbance of vegetation cover, changes in hydrological conditions due to topographic modification by detachment sliding and the formation of a fresh active layer affect rates of surface wash erosion. Detachment slides generally accumulated more snow than adjacent slopes and yielded greater amounts of surface runoff than vegetated slopes with similar snow covers. Surface drainage was inhibited on well-vegetated hummocky slopes where lags between radiation inputs and discharge responses were greater than at the rilled detachment slide plots. During rainfall events following snowmelt, plot response was affected by antecedent moisture conditions and the vegetation cover: surface flow was generated only in detachment slide scars and at the mixed plots but not on vegetated undisturbed slopes or on the bare undisturbed slope. Suspended sediment concentrations at the fresh detachment

slide scars are two orders of magnitude greater than on vegetated slopes. At disturbed slopes suspended sediment removal exceeds solute erosion by over one order of magnitude. The highest solute concentrations (> 12700 mg/L) were measured at the fresh detachment slide scar in marine sediments. Soil solute concentrations in the fresh active layer were two orders of magnitude greater than on adjacent undisturbed slopes. The removal of the active layer allows the underlying permafrost to thaw in subsequent years. New flow paths over and through this soil develop, and if in marine deposits, salts which have been held in place by freezing, can be released. Greater amounts of surface runoff production at fresh scars and the removal of vegetation result in high rates of surface erosion and high sediment yields (1560 g/m2) at fresh detachment slide scars. Abiotic conditions at the scar (rapid removal of meltwater, high rates of erosion, elevated salt concentrations in fresh active layers if sliding occurs in marine sediments) may inhibit recolonization by plants, prolonging high rates of suspended sediment erosion. Elevated amounts of suspended sediment erosion at the pre 1950 scars (>260 g/m2) suggest that detachment sliding affects surface wash erosion rates for years to decades.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Hot Weather Creek, Ellesmere Island, Nunavut

98-051 KOKELJ, S.V. and LEWKOWICZ, A.G. (1998). Long-term influence of active-layer detachment sliding on permafrost slope hydrology, Hot Weather Creek, Ellesmere Island, Canada. Conference Abstract, 7th International Conference on Permafrost, Yellowknife, N.W.T., June 1998.

ABSTRACT/DESCRIPTION:

The effect of active-layer detachment sliding on snow accumulation and surface runoff, was evaluated in 1996 using nine runoff plots established on a range of recent and old slides and on undisturbed slopes. There was a strong positive relationship between snow accumulation and surface runoff for unvegetated recent slides and older partially vegetated slides. Detachment slide scars generally accumulated more snow than adjacent slopes and consequently exhibited higher runoff coefficients. Inter-year comparisons for two of the plots revealed both lower snow accumulations and less runoff in 1993. The minimum amount of end-of-winter snow needed to generate overland flow at vegetated sites was much greater than that for unvegetated sites. Rainfall-induced runoff also was greater at the landslide sites compared to adjacent vegetated areas. The higher amounts of runoff generated at detachment slide sites are partly responsible for accelerated erosion that maintains the bare scar areas.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Hot Weather Creek, Ellesmere Island, Nunavut

98-052 LACOURSE, T. (1998). Late Quaternary Vegetation History of Sulphur Lake, SouthwestYukon Territory, Canada. M.A. Thesis, Department of Geography, Graduate Studies and Research, University of Ottawa.

ABSTRACT/DESCRIPTION:
Palaeoecological studies based on the analysis of pollen in lake sediments offer the potential for high resolution and well-dated independent records of past vegetation and climate. Sulphur Lake, located in the southwest Yukon (60.95 N, 137.95 W; 847 m), was chosen for a paleoecological study to explore postglacial vegetation dynamics in this region of the boreal forest. A 5 m sediment core was raised from the deepest section of Sulphur Lake using a modified Livingstone piston corer. The sequence spans the full postglacial and reveals significant late glacial and Holocene vegetation changes that provide new information on the regional paleoecological history of the southwest Yukon. The pollen spectra indicate that between approximately 12,000 and 11,250 yr BP, the vegetation was an open alpine tundra marked by the presence of Artemisia. The vegetation then progressed from an open birch shrub tundra to a poplar woodland at 10,250 yr BP. Juniperus populations expanded at 9500 yr BP and by 8400 yr BP, spruce invaded the region. The relatively closed white spruce forest that occupies the region today was established by approximately 8000 yr BP. *Alnus* crispa increased at 6000 yr BP, however the increase in *Picea mariana* found at this time at most sites in the Yukon was not present at Sulphur Lake. Black spruce was not a dominant component of the vegetation in the Shakwak Trench as it was to the immediate southeast. The basal radiocarbon date demonstrates that the chronology of regional deglaciation needs to be more firmly established.

DISCIPLINE: Botany

FIELDWORK LOCATION: Sulphur Lake, Yukon

98-053 LAMIRANDE, I. et LAURIOL, B. (1998). Origine des sediments retrouvés sur une terrasse de cryoplanation dans les Territoires du Nord-Ouest, Canada. Résumé de conférence, l'Association Canadienne des Géographes, Congrès annuel, Ottawa, Ontario, juin 1998.

RÉSUMÉ/DESCRIPTION :
L'objectif de cette recherche n'est pas de simplement compiler des observations qualitatives de plusieurs auteurs concernant les terrasses de cryoplanation, mais plutôt de déterminer la nature et l'origine des sédiments retrouvés sur les replats d'une terrasse de cryoplanation située dans les Territoires du Nord-Ouest. Ces terrasses, ayant l'allure d'escaliers géants sont des surfaces d'érosion entaillées dans la roche-mère. Elles se composent de replats faiblement inclinés, suivis d'escarpements. L'étude du matériel retrouvé sur les replats, établit les relations existantes entre les talus de blocs et les sédiments fins. L'altération de la roche-mère, soit des grès du groupe Bug Creek, produit les sables, les argiles et les silts

retrouvés sur les replats des terrasses. La formation de particules fines par la micro-f ratu ration des grains de sables est en fait très efficace. Étant donne que plus de 3/4 des sédiments retrouvés sur les replats sont de la taille des silts et des argiles. Les résultats granulométriques, les analyses effectuées au microscope à balayage, ainsi due les résultats au XRF, nous permettent d'affirmer que les terrasses de cryoplanation dans cette étude sont actives et que le matériel est, en fait, autochtone.

DISCIPLINE : Géographie Physique

LIEU DU TRAVAIL SUR LE TERRAIN : T.N.-O.

98-054 LEWKOWICZ, A.G. and CLARKE, S.A. (1998). Late-summer solifluction and active layer depths, Fosheim Penisula, Ellesmere Island, Canada. Conference Abstract, 7th International Conference on Permafrost, Yellowknife, N.W.T., June 1998.

ABSTRACT/DESCRIPTION:
Measurements of solifluction using electro-mechanical meters over a period of 5 years at Hot Weather Creek show that summers with deep thaw produce enhanced rates of movement throughout the active layer. Within a basal transitional layer, the soil thaws and moves in some years but remains immobile and frozen in others. Predictions from a simple model involving displacements in a shear zone at the bottom of the active layer agree with measured subsurface movements below depths of 35-40 cm. This indicates that a shear zone, whose location depends on the depth of thaw, can explain the lower part of the velocity profile in this area of two-sided freezing, but that other processes, notably frost creep and isolated shearing, are important nearer the surface.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Ellesmere Island, Nunavut

98-055 SAWADA, M. and JOHNSON, P.G. (1998). Discharge, suspended sediment concentration, and conductivity of the Slims River, Yukon Territory, Canada. Presentation, The Canadian Association of Geographers, Annual Meeting, June 1998.

ABSTRACT/DESCRIPTION:
Summer discharge of the Slims River in both 1993 and 1994 was strongly positively correlated with air temperature. Precipitation events, which were infrequent and of low magnitude, had little effect on the hydrograph. Peak seasonal discharge occurs due to glacier ice-melt in the basin after the early season snowmelt from the lower basin. Total discharge in 1993 was greater than that of 1994 but was still considerably lower than reported peak flows. Diurnal clockwise hysteresis defines the short term relation between suspended

sediment concentration and discharge causing poor explanation of variance of suspended sediment concentration by discharge. The dominant cations are Ca2+, Mg2+, K+ and Na+, each of which has a strong positive relation with conductivity. The high absolute values of Ca 2 and Mg2+ reflect the occurrence of dolomite in the basin. Conductivity, and thus individual cation concentrations, decrease through both seasons and are inversely related to discharge. Diurnal conductivity amplitude was greatest during the glacier melt period and clockwise hysteresis defines the short term relation between discharge and conductivity leading to a poor explanation of variance of conductivity by discharge.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Slims River, Yukon

98-056 CANUEL, R., LUCOTTE, M. and DUCHEMIN, É (1998). Continuous monitoring of carbon dioxide emission fluxes from a northern hydroelectric reservoir. Poster, American Society of Limnology and Oceanography-Ecological Society of America Conference (ASLO-ESA), St-Louis, USA, June 7-12, 1998.

ABSTRACT/DESCRIPTION:
We developed an original automated device capable of measuring dissolved carbon dioxide concentrations near the air-water interface of aquatic ecosystems at a rate of 6 samples per hour. This prototype was successfully used to follow $C0^2$ dissolved concentration fluctuation at the surface of a shallow water sampling station located in a secluded bay of Laforge-1 hydroelectric reservoir (Northern Québec-Canada) We present here the results of four sequence of measurements obtained right after the ice melt. Our data set suggest that the $C0^2$ dissolved concentration of shallow stations are strongly controlled by the mixing of the water column associated with wind episodes. Our original prototype has proven to be a promising tool in the study of short term variations in $C0^2$ dissolved concentration in remote area and under meteorological conditions that would prevent the use of conventional gas flux measurement techniques.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: James Bay, Northern Québec

98-057 DEMERS, F., GIROUX, J.-F. et GAUTHIER, G. (1998). Effet du marquage des oies avec émetteurs sur le maintient du couple et le comportement de la Grande oies des neiges. Présentation, SQEBC, Université Concordia, 6-8 novembre 1998.

RÉSUMÉ/DESCRIPTION :
Lors d'une première étude impliquant des oies munies de colliers émetteurs, on a observé que plus de 40 pour cent n'étaient plus avec leur partenaire initial durant l'année suivant la pose du collier. L'objectif de notre étude était donc d'établir l'importance du phénomène de changement de statut chez les Grandes Oies des neiges munies de colliers émetteurs et d'identifier les facteurs influençant la dynamique des couples d'oies. Ces facteurs peuvent être la mortalité du mâle, l'effet des colliers émetteurs sur le comportement des individus, l'effet des captures subséquentes ainsi que les dérangements sur les aires de gagnage. 60, 80 et 80 colliers émetteurs (55g) ont respectivement été installés sur des femelles en août 1996, 1997 et 1998 à l'Île Bylot, située à l'extrême nord de la Terre de Baffin (T.N.-O.), tandis que leurs mâles ont été marqués à l'aide de colliers conventionnels (22g). Au printemps 1998, nous avons observé que 64 pour cent étaient demeurées avec leur partenaire initial, 23 pour cent étaient seules et 13 pour cent associées avec un nouveau partenaire. De

plus, 158 périodes d'observation ont été réalisées sur 138 oies différentes, dont 38 colliers émetteurs, 40 colliers conventionnels et 60 contrôles pour un total de 55 heures. Aucune différence dans le budget d'activité des femelles munies de collier émetteur, de collier conventionnel et de celles ne portant aucun collier n'a été observée. Il semble que les oies peuvent s'adapter au collier émetteur après une période d'adaptation, qui suivrait la pose du collier. Dès l'automne, leur comportement ne s'en trouverait plus affecté.

DISCIPLINE : Biologie

LIEU DU TRAVAIL SUR LE TERRAIN : Île Bylot, Nunavut

98-058 DUCHEMIN, E., LUCOTTE, M. and CANUEL, R. (1998). Greenhouse gas emissions from hydroelectric reservoirs in boreal region. Poster, American Society of Limnology and Oceanography-Ecological Society of America conference (ASLO-ESA), St-Louis, USA, June 7-12, 1998.

ABSTRACT/DESCRIPTION:
Since 1993 hydroelectric reservoirs are evaluated to be significant sources of greenhouse gases. Following an evaluation of the atmospheric fluxes of $C0^2$ and CH^4 from three hydroelectric reservoirs in the boreal region, flooded since 1926, 1978 and 1993, we found that diffusive fluxes from these reservoirs range from 1200 mg m-2 d-1 (± 800, n=296) and 8 mg m^{-2} d-1 (±5.2, n=404) for $C0^2$ and CH^4 respectively. However, large heterogeneity observed in the GHG diffusive fluxes between reservoirs and within the same reservoirs, even within the same geographical region, shed a great deal of uncertainties on global flux estimation. In addition bubble evasion of CH^4 from these reservoirs represent one third of the diffusive fluxes for CH^4, with an average of 2.5 mg m^{-2} d-1 (± 6, n=49). For $C0^2$, bubbles evasion represent a marginal part (less of 1 percent) of overall emission of this gas. We however, observed no statistical difference between these emission fluxes from reservoirs of 1, 2, 3, 4, 15, 16, and 69 years old. To complete the evaluation of atmospheric fluxes we conducted, during winter season, measurements to evaluate the importance of this period in the GHG emission budget. We measured ebullitive fluxes under the ice-cover and evaluate the potential GHG emission following ice-melt. Ebullitive fluxes was in the same order in winter than in summer and the potential emission after the icemelt range from 5000 to 20000 mg m^{-2} and 100 to 675 mg m^{-2} of $C0^2$ and CH^4, respectively. After four years of intensive sampling it is possible to roughly evaluate a minimum carbon emission of 64 g of Carbon per m^2 per year from hydroelectric reservoirs. With a carbon burden of 3600g of carbon per m^2 in the flooded forest soils after 70 years we did observe bare soils. But we did not observe any statistical difference in carbon content between soils flooded since 1 to 4, 15, and 70 year and pristine equivalent. We face a problem of carbon mass balance in the reservoirs. The soils are not the unique source for the production of GHG. Input of atmospheric $C0^2$ and run off-shore erosion could be identified as potential organic matter sources available for GHG production.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: James Bay, Northern Québec

98-059 DUCHEMIN, E., LUCOTTE, M. and CANUEL, R. (1998). Compared emissions of greenhouse gases from boreal and tropical hydroelectric reservoirs. Presentation, XXVII Congress of the International Association of Limnologist (SIL); Dublin (Irlande), August 9-14 , 1998.

ABSTRACT/DESCRIPTION

Direct measurements show that boreal reservoirs are significant sources of greenhouse gases (GHG) through diffusive and ebullitive processes. Comparatively, preliminary studies reveal that GHG diffusive fluxes from tropical reservoirs are of the same order of magnitude, but ebullitive fluxes are much higher. Large spatial and temporal heterogeneities in the gas emissions make it so far hazardous to present a global estimate of the GHG released by a given reservoir. Moreover, carbon mass balance calculations indicate that the organic matter originally present in soils cannot solely account for the GHG emissions from a flooded land on several decades, and that the organic carbon leached from the drainage basin must be included.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: James Bay, Northern Québec

98-060 MONTGOMERY, S. and LUCOTTE, M. (1998). Dissolved and particulate mercury in hydroelectric reservoirs of Northern Québec. Presentation, Mercury in Eastern Canada and the Northeast States Conference, Fredericton, New Brunswick, September 21-23, 1998.

ABSTRACT/DESCRIPTION

In the scope of a broadly based study of the biogeochemical cycling of Hg in hydroelectric reservoirs, concentrations of dissolved and particulate total and methyl Hg were monitored over a four year period, from 1994 to 1997, in flooded and natural aquatic systems. While low concentrations of dissolved MeHg (0.28 ± 0.02 ng L-1, n=87) in reservoirs are indicative of the important dilution occurring when this compound is transferred from surface layers of flooded soils to the water column, sampling in shallower areas (<3 m) has revealed a marked increase (up to 8 times) in concentrations with increased water column temperature and is attributed to enhanced bacterial activity, as well as a reduced influence of dilution. As a similar trend was not noted for total Hg, the results demonstrate that seasonal pulses of MeHg production are important and independent of total Hg levels and that they can cause significant variations in flooded systems. With respect to particulate fractions, similar

seasonal increases for total Hg have been observed. Working in the Laforge and Cabonga reservoirs (created in 1993 and 1929, respectively), the results show that irrespective of the region sampled the concentrations of total Hg increase systematically in conjunction with increasing water column temperatures. Although inter-site variations exist with respect to absolute levels, similar dynamics seem to be controlling total Hg concentrations. Since Hg-rich organic particles have been recognized as a potential source of food for zooplankton and, hence, as a vector of contamination to the entire food chain, a concerted effort has been made to better characterize the suspended particulate matter. The analytical approaches developed by organic geochemists offer a means, via indirect measurements, to gather important details about the composition, sources and state of organic matter. For example, the analysis of a suite of lipid-derived products, indicative of non-terrestrial organic matter sources, as well as terrestrially-derived phenols, indicate that the particulate organic matter sampled in lakes and reservoirs is composed of similar source material. In contrast, a greater abundance of bacterial biomarkers strongly suggestive of sulfate reducers in the suspended particulate matter fractions of flooded as compared to pristine sites differentiates these aquatic systems and may help to explain why biotic MeHg levels are up to five times greater in reservoirs. Additionally, a microscopic analysis of the fine particulate fraction revealed the presence of the mixotrophic algae, Dinobryon , that, in the presence of plentiful dissolved food, turns predator and feeds on bacteria. These findings, as well as an observed positive linear correlation between zooplankton and fine particulate MeHg levels in reservoirs, strongly suggest that suspended material is not only a bioaccumulable source of MeHg to grazing organisms but a possible site of active Hg methylation.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: James Bay, Northern Québec

98-061 BARNES, S.D. (1998). "Paleogeography and Paleolimnology of latest Pleistocene Glacial Lake Champagne". GSA, 30(7), October 26, 1998.

ABSTRACT/DESCRIPTION:
Detailed sedimentological analysis of sediment outcrops in south-central Yukon suggest that Glacial Lake Champagne (GLC) existed for a period of approximately 400 years, between ca. 12 500 and 10 500 BP in the valleys of the Yukon and Dezadeash rivers and their tributaries. Initial stratigraphic evidence suggests that much of the shoreline of GLC was bounded by Cordilleran glacial ice, leading to variation in both sedimentary regime and lake surface elevation. On the basis of sedimentary structures, it is inferred that sediment deposition in GLC alternated between turbidity current-dominated underflow regimes and laminated silts and clays originating from over and interflows of sediment-laden glacial melt-water. Underflow sedimentation is evidenced by sandy facies containing climbing ripples and other cross-stratifies forms, while inter and overflow regimes are represented by laminated (varved?) Muds. GLC is suggested to have had at least two stands, with elevations indicated by several Gilbert-style deltas, one of which shows evidence of two distinct stages of GLC, first at 765 m asl, followed by incision and continued deposition at 725 m asl. Sedimentology of these deltas is consistent with high-energy glacio-fluvial processes, and may in turn be used to infer paleogeographic conditions leading to the observed patterns of lake sedimentation.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Lake Champagne, Yukon

98-062 BRISKIE, J., MONTGOMERIE, R., POLDMA, T. and BOAG, P.T. (1998). "Paternity and paternal care in the polygnanadrous Smith's longspur". Journal of Behavioural Ecology and Sociobiology, 43:181-190.

ABSTRACT/DESCRIPTION:
In species where females copulate with more than one male during a single breeding attempt, males risk investing in offspring that are not their own. In the polygynandrous Smith's longspur (*Calearius pictus*), females copulate sequentially with one to three males for each clutch of eggs and most of these males later assist in feeding the young. Using multilocus DNA profiling, we determined that there was mixed paternity in > 75 percent of broods (n=31) but that few offspring (<I percent of 114 nestlings) were sired by males outside the polygynandrous group. Male feeding rate increased significantly with the number of young sired, with males siring four nestlings feeding the brood at double the frequency of males siring only a single nestling. However, male Smith's longspurs appear to show a graded

adjustment of paternal care in response to paternity only when other males are available to compensate for reduced care: feeding rate did not vary in relation to paternity when only one male provisioned young at the nest. There was no evidence that males could recognise their own offspring within a brood and feed them preferentially. The number of offspring sired by each male was significantly correlated with the number of days spent copulating with the attending female: on average, a male sired one offspring for every 2 days of copulatory access. If males use their access to females to estimate paternity (and thereby decide on their subsequent level of parental investment), a positive relationship is expected between the amount of female access and the subsequent feeding rate to the nestlings. Nonetheless, male feeding effort was only weakly correlated with female access and more study is needed to determine how males estimate their paternity in a brood.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Churchill, Northern Manitoba

98-063 GREGORY-EAVES, I. (1998). Reconstructing Climatic and Environmental Trends in Alaska Using Diatom-Based Research. M.Sc. Thesis, Faculty of Graduate Studies, Queen's University.

ABSTRACT/DESCRIPTION:
Environmental and diatom data from a calibration set of 51 lakes, spanning a strong climatic gradient in Alaska, were analysed in order to: (1) describe patterns of environmental variation; and (2) develop diatom-based inference models of environmental variables that may be influenced by climate. Principal components analysis of the environmental data revealed that ionic and nutrient gradients, as well as aluminum concentration, varied most strongly in the data set. Calibration lakes, classified according to pre-determined ecozonal groups, had significant between-group variations in lake-water chemistry and temperature. Climatic and vegetational factors could be attributed to the strong limnological differences between the northern forest zone and arctic tundra, whereas the likely cause(s) for the differences between the northern forest zone and southern forest zone are unresolved at this point. The main directions of diatom variation within the calibration set, revealed through canonical correspondence analysis, could largely be explained by the same gradients identified through environmental analyses. Robust models for depth, conductivity, and total nitrogen-nitride were developed through weighted-averaging partial least squares (r^2jack values of 0.60, 0.62, and 0.58, respectively) whereas partial least squares was strongest for total phosphorus unfiltered (r^2jack = 0.49).

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Fairbanks, Alaska

98-064 HOLDER, K.M.R. and FRIESEN, V. (1998). Phylogeography of North American Rock Ptarmigan: a Test of the Glacial Refugium Hypothesis. Presentation, Ontario Ecology and Ethology Colloquium, Kingston, Ontario, May 4-6, 1998.

ABSTRACT/DESCRIPTION:
Early studies of the distributions of northern birds and mammals suggested that, in addition to Beringia and regions south of the ice sheets, smaller glacial refugia supported flora and fauna during the last ice age. Refugial populations differentiated, giving rise to current patterns of geographic variation. We tested this Glacial Refugia Hypothesis as a model for evolutionary divergence of rock ptarmigan in North America, using genetic analysis of the mitochondrial control region. We identified several divergent lineages which are geographically segregated and correspond to sites of putative refugia. Consequently, patterns of molecular variance indicate significant genetic structuring of populations. Moreover, the distribution of genetic variation is concordant with morphometrically defined subspecies. Our estimates of divergence times of lineages suggest that North American rock ptarmigan became isolated in several refugia during the most recent glaciation event, and that current patterns of genetic variation reflect postglacial colonization by divergent lineages rather than isolation by distance. These refugia may therefore have functioned as sources for postglacial recolonization of North America by a variety of taxa.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Ellesmere Island, Bathurst Island, Cornwallis Island, Nunavut

98-065 HOLDER, K.M.R. (1998). Evolutionary Divergence and Historical Biogeography of Rock Ptarmigan (*Lagopus mutus*). Ph.D. Thesis, Faculty of Graduate Studies and Research, Queen's University,

ABSTRACT/DESCRIPTION:
I studied population genetic and phylogenetic patterns within rock ptarmigan (*Lagopus mutus*) to test alternative models for evolutionary divergence within Nearctic species. I analysed patterns of variation in the mitochondrial control region and an intron in the gene for glyceraldehyde-3-phosphate dehydrogenase to elucidate the effects of vicariance and demography on differentiation of populations. I also determined the sequence of an internal transcribed spacer, which was invariant for all individuals. Control region sequences revealed strong population and phylogeographic structure. Variation in intron sequences also revealed significant population structure. Both variable markers indicated low levels of gene flow among highly differentiated populations and subspecies. However, isolation by distance did not account for the pattern of gene flow or differentiation. The presence of three major phylogenetic lineages in the Aleutian Islands, two of which were endemic, resulted in high levels of genetic diversity within this formerly glaciated archipelago. Thus, endemic Aleutian subspecies of rock ptarmigan contribute significantly to genetic diversity within the species

and to the biodiversity of the Aleutian Islands. In a test of the Glacial Refugium Hypothesis for evolutionary divergence of northern taxa, the current distributions of morphologically distinct subspecies were concordant with six Nearctic glacial refugia; the distributions of closely-related control region haplotypes were geographically concordant with five such refugia. Estimates of the time since phylogenetic lineages diverged predated the late Wisconsin glacial maximum for all but two lineages. In addition, evidence suggests that two unknown refugia in the Bering region supported rock ptarmigan during the late Wisconsin. These results are most consistent with the hypothesis-that isolated populations of rock ptarmigan diverged in multiple refugia during the late Wisconsin, and that geographic variation reflects patterns of postglacial recolonization. This hypothesis may therefore offer the most plausible explanation for similar biogeographic patterns in other Nearctic vertebrates.

DISCIPLINE: Environmental Sciences/ Ecology

FIELDWORK LOCATION: Aleutian Islands, Alaska

98-066 HOLDER, K.M.R., MONTGOMERIE, R. and FRIESEN, V. (1998). A test of the Glacial Refugium Hypothesis using patterns of mitochondrial and nuclear DNA sequence variation in Nearctic rock ptarmigan (*Lagopus mutus*). Presentation, Annual Meeting, Society of the Study of Evolution, June 1998.

ABSTRACT/DESCRIPTION:
The Glacial Refugium Hypothesis (GRH) proposes that glaciers promoted differentiationand generation of intraspecific diversity by isolating populations in ice-free refugia. We tested three predictions of this hypothesis for the evolutionary divergence of rock ptarmigan (*Lagopus mutus*) during the late Wisconsin glaciation of the Pleistocene Epoch. To do this, we examined subspecies distributions, population genetic structure and phylogenetic relationships in 26 populations across North America and the Bering Sea region. First, we analysed sequence variation in the mitochondrial control region, in a nuclear intron and in an internal transcribed spacer (ITS1). Control region sequences of 154 rock ptarmigan revealed strong population and phylogeographic structure. Variation in intron sequences of 114 rock ptarmigan also revealed significant population structure compatible with results for the control region. Intron variation was not phylo geographically ordered, however, likely due to incomplete lineage sorting. Rock ptarmigan were invariant for ITS1. Second, we show that six known Nearctic refugia are concordant with the current distribution of morphologically distinct subspecies; five of these refugia are geographically concordant with the distribution of closely-related control region haplotypes. Third, our estimates of the time since phylogenetic lineages diverged predated the last glacial maximum for all but two lineages. In addition, all lines of evidence suggest that two unknown refugia in the Bering region supported rock ptarmigan during the late Wisconsin. Overall, our results are most consistent with the hypothesis that isolated populations of rock ptarmigan diverged in

multiple refugia during the late Wisconsin, and that geographic variation reflects patterns of recolonization of the Nearctic after the ice receded. The GRH may therefore offer the most plausible explanation for similar biogeographic patterns in a variety of Nearctic vertebrates.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Aleutian Islands, Alaska

98-067 KIDD, M.G. and FRIESEN, V.L. (1998). "Sequence Variation in the Guillemot (*Alcidae: Cepphus*) Mitochondrial Control Nuclear Region". Journal of Molecular Biology and Evolution, 15(1):61-70.

ABSTRACT/DESCRIPTION:
We describe sequence variation in the mitochondrial control region and its nuclear homologs in three species and seven subspecies of guillemots (*Cepphus spp.*). Nuclear homologs of the 5' end of the control region were found in all individuals. Nuclear sequences were -50 percent divergent from their mitochondrial counterparts and formed a distinct phylogenetic clade; the mitochondrial-nuclear introgression event must have predated the radiation of *Cepphus*. As in other vertebrates, the guillemot control region has a relatively conserved central block flanked by hypervariable 5' and 3' ends. Mean pairwise interspecific divergence values among control regions were lower than those in other birds. All individuals were heteroplasmic for the number of simple tandem nucleotide repeats (A(n)C) at the 3' end of the control region. Phylogenetic analyses suggest that black guillemots are basal to pigeon and spectacled guillemots, but evolutionary relationships among subspecies remain unresolved, possibly due to incomplete lineage sorting. Describing molecular variation in nuclear homologs of mitochondrial genes is of general interest in phylogenetics because, if undetected, the homologs may confound interpretations of mitochondrial phylogenies.

DISCIPLINE: Biology

FIELDWORK LOCATION: Svalbard and Sud Fugloya, Norway

98-068 KIDD, M.G. and FRIESEN. V.L. (1998). "Analysis of Mechanisms of Micro-Evolutionary Change in *Cepphus* Guillemots Using Patterns of Variation". The Society for the Study of Evolution, 52(4): 1158-1168.

ABSTRACT/DESCRIPTION:
We surveyed population-level sequence variation in part of the mitochondrial control region for three species including eight subspecies of *Cepphus* guillemots (*Charadriiformes: Alcidae*) to test specific predictions about mechanisms of population differentiation. We found that sequences of spectacled guillemots (*C. carbo*) were more closely related to those

of pigeon guillemots (*C. columba*; both found in the Pacific Ocean) than to those of black guillemots (*C. grylle*; Arctic and Atlantic Oceans), despite dissimilarities in plumage between spectacled guillemots and the other species. Distributions of species and timing of divergence events suggest that speciation involved allopatric and microallopatric populations isolated by Pleistocene glaciers. Control region sequences were significantly differentiated among populations within species and suggest that gene flow is low; however, populations are probably not in genetic equilibrium, so these results probably reflect historical isolation of colonies. In contrast, phylogenetic relationships among sequences within species were poorly resolved, probably because of a combination of incomplete lineage sorting and contemporary gene flow. Indices of genetic diversity provided no suggestion of recent bottlenecks in most populations, although two populations apparently underwent recent severe bottlenecks. Genetic divergence among populations was not correlated with geographic distance, which argues against isolation by distance. Results of these analyses, combined with breeding distributions and timing of divergence events, suggest that populations diverged during isolation in glacial refugia. Our results are consistent with earlier hypotheses posed by Storer and Udvardy.

DISCIPLINE: Biology

FIELDWORK LOCATION: Svalbard, Sud Fugloya, Norway

98-069 LEFEVRE, K., MONTGOMERIE, R. and GASTON, A.J. (1998). "Parent-offspring recognition in thick-billed murres (*Aves: Alcidae*)". Journal Animal Behaviour, 55:925-938

ABSTRACT/DESCRIPTION:
Using field experiments, we investigated the development of parent-offspring recognition in the thick-billed murre, *Uria lomvia*. Cross-fostering experiments (N= 73) showed that the likelihood of parents accepting a foreign chick decreased with chick age. Simultaneous-choice playback experiments demonstrated that chicks discriminate between the calls of their parents and both strange and familiar adult conspecifics from as early as 3 days old. In presentation experiments with chicks of fledging age (equal to or greater to 14 days), adults responded more strongly to the calls of their own chicks than to other familiar chicks from the same breeding ledge. Results are consistent with those of earlier studies of parent-offspring recognition in the congeneric and ecologically similar common murre, *U. aalge*, which were among the first to suggest that parent birds and their chicks can identify each other's calls.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Coats Island, Nunavut

98-070 LODHA, V. (1998). Molecular Evidence for Possible Sympatric Divergence Madeiran Storm Petrels (*Oceanodroma castro*). B.Sc. Honours Thesis, Department of Biology, Queen's University.

ABSTRACT/DESCRIPTION:
Central to understanding evolutionary theory is the documentation of various mechanisms of speciation. Sympatric speciation is a controversial mode of divergence according to which new sister species evolve within the dispersal range of offspring from a single population. Madeiran storm petrels (*Oceanodroma castro*) may represent a case of sympatric speciation through divergence in the seasonal time of breeding. This study surveys variation in the control region of the mitochondrial genome and two nuclear intros (from x enolase and lamin) to estimate the degree of genetic divergence between populations of Madeiran storm petrels breeding during different seasons in the Azores. Individuals were screened for variation for each focus by analysis of single stranded conformational polymorphisms (SSCPs). x2, Fst and Y tests for the 5' end of the control region indicated significant differences between seasonal populations, suggesting a high degree of genetic differentiation. None of the genotypes were shared between seasonal populations, indicating fixed differences. The highly significant results and fixed differences suggest that the seasonal populations are reproductively isolated, providing initial evidence for sympatric speciation. x2 and Fst values calculated from combined data of x enolase and lamin showed no significant genetic differences between seasonal populations. This result may be explained by a slower rate of mutation compared to mtDNA, combined with a recent divergence of populations.

DISCIPLINE: Biology

FIELDWORK LOCATION: Aleutian Islands, Alaska

98-071 MOSER, K.A., SMOL, J.P., LEAN, D.R.S. and MACDONALD, G.M. (1998). "Physical and chemical limnology of northern boreal lakes, Wood Buffalo National Park, Canada". Hydobiologia, 377: 25-43.

ABSTRACT/DESCRIPTION:
Physical and chemical variables were measured in 35 lakes from Wood Buffalo National Park, northern Alberta and Northwest Territories, Canada. Of these lakes, 22 were sinkholes, situated on limestone and gypsum, five were situated on the Canadian Shield and eight were shallow "muskeg" lakes located on calcareous shales. All of the lakes were small to moderate in size. For each of the 35 lakes, 37 environmental variables were measured. Principal component analysis (PCA) revealed that underlying geology strongly influenced limnic properties. Shield lakes were characterized by higher concentrations of Al and Fe, and lower pH values, specific conductivities and concentrations of ions such as , Ca, SO4, Li, Mg and Na, than either the sinkhole or the muskeg lakes. The muskeg lakes were differentiated from

the sinkhole lakes by decreased Secchi depth owing to higher concentrations of dissolved organic carbon (DOC) and greater productivity, as evidenced by high concentrations of particulate organic carbon (POC) and chlorophyll a. Nitrogen (NH3 and NO2) was also notably higher at these sites.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Wood Buffalo National Park, Northern Alberta

98-072 TURNER, E. (1998). Effects of ovarian fluid on sperm motility in Arctic charr, *Salvelinus alpinus*. B.Sc. Thesis, Department of Biology, Queen's University,

ABSTRACT/DESCRIPTION:
Ovarian fluid is a natural component of a fish spawning medium and therefore is thought to influence the motility of sperm. However, the effects of ovarian fluid are rarely considered in motility studies. My study is therefore the first to examine the effects of different concentrations of ovarian fluid (0 percent, 5 percent, 25 percent, 50 percent ovarian fluid) on sperm motility parameters. I examined the previously unstudied sperm of Arctic char, *Salvelinus alpinus*, following activation with ovarian fluid dilutions, and I found that the average, straight and maximum swimming speeds of sperm increased with increasing concentrations of ovarian fluid. There was also an increase in the linearity of the swimming trajectories, and the maximum duration of motility. At 10 s following activation with freshwater, sperm swam at an average speed of 105.92 um/s, with a mean linearity index of 0.82. At 30 s following the same activation, sperm swam at an average speed of 20.60 um/s, with a mean linearity index of 0.88. These sperm were motile for an average 42 s. At 10 s following activation with 50 percent ovarian fluid, sperm swam at an average speed of 107.57 um/s, with a mean linearity index of 0.94. At 30 s following the same activation, sperm swam at an average speed of 39-10 um/s, with a mean linearity index of 0.93. These sperm were motile for an average 123 s. I conclude that ovarian fluid enhanced the motility of arctic charr sperm, and that these effects were intensified with increasing concentrations of ovarian fluid.

DISCIPLINE: Biology

FIELDWORK LOCATION: Whitehorse, Yukon

98-073 DAVIS, C. (1998). A Case Study of Polar Bear Co-Management in the Eastern Arctic. Presentation, 22nd Annual Meeting of the Prairie Division of the Canadian Association of Geographers, October 17, 1998.

ABSTRACT/DESCRIPTION:
In 1986, the first agreement on the management of the polar bear in Canada was signed between the Hunters' and Trappers' Organisations (HTO) of Clyde River and Broughton Island and the Government of the Northwest Territories (GNWT). This agreement has since functioned as a template for the creation of similar contracts throughout the Canadian North. The 1986 agreement was informed by a state policy of devolution and represented an attempt to share management responsibility between Inuit organisations and the GNWT. The case study that will be presented consists of an analysis of the negotiation and formation of the 1986 polar bear management agreement. The problem is that a co-management approach to regulating the harvest of wildlife does not necessarily ensure that decisions between Inuit organisations and the GNWT are made jointly. This presentation is restricted to an analysis of the effectiveness of the co-management approach in meeting the objectives of the signatory parties.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Clyde River and Broughton Island, Nunavut

98-074 JOLY, D.O., LEIGHTON, F.A. and MESSIER, F. (1998). Effects of tuberculosis and brucellosis on pregnancy rates in bison. Presentation, 47th Annual Wildlife Disease Association Conference, Madison, WI, August 10, 1998.

ABSTRACT/DESCRIPTION:
We present preliminary data on the effect of bovine tuberculosis (*Mycobacterium bovis*) and brucellosis (*Brucella abortus*) on pregnancy rates in wood bison. In the winter of 1997, bison were captured and tested as part of an ongoing investigation into the effects of these diseases on the population dynamics of bison. Tuberculosis infection was determined using the caudal fold and an enzyme-linked immunosorbent assay. The competent fixation and buffered plate antigen tests were used to test for brucellosis. We determined pregnancy rates by testing for pregnancy-specific protein B and evaluating serum progesterone levels. The total pregnancy rate for adult female bison (2 years) was 78 percent (73). We were unable to detect an effect of brucellosis infection on pregnancy rate, however a lack of statistical power prevents us from making conclusions in this regard. Further, pregnancy determination was done in late February and early March, before the period where most brucellosis-induced abortions would occur. We found that bison that tested positive for tuberculosis had a significant lower

pregnancy rate than those that tested negative (66 percent vs. 95 percent). This is the first report of an effect of tuberculosis on pregnancy rates in bison.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Wood Buffalo National Park, N.W.T.

98-075 KUTZ, S.J., HOBERG, E.P., NISHI, J.S. and POLLEY, L. (1998). Development of the Muskox Lungworm, *Umingmakstrongylus pallikuukensis*, in the slug *Deroceras laeve*, under arctic field conditions with comments on the impact of climate change. Presentation, Annual Wildlife Disease Association Conference, Madison, WI, August 10, 1998.

ABSTRACT/DESCRIPTION:
Umingmakstrongylus palfikuukensis was first recognized in 1988 in muskoxen west of Kugluktuk, NT. The prevalence approaches 100 percent in adult muskoxen in this region yet the parasite is absent from the arctic islands. First stage larvae in faeces develop to third stage larvae (L3) in at least 4 terrestrial and 1 freshwater gastropod found near Kugluktuk. Development rates to L3 depend on temperature. Field studies of larval development in *D. leave* were done during the summer of 1997. Slugs infected late June to mid July contained L3 by 4 to 6 weeks post infection while those infected July 31 or later did not produce L3 before winter. Recovery in September of live L3 from the vegetation of June 19 and July 3 experiments confirmed laboratory findings of larval emergence from slugs. *U. pallikuukensis* in muskoxen is a temperature dependent system in which larval development and patterns of parasite transmission and distribution may be influenced by change in global temperatures. Temperature records indicate a 50 year warming trend in the Mackenzie District of 1.29'C. *U. pallikuukensis* in muskoxen offers a theoretical and applied model system to elucidate the complex linkage of global climate change to wildlife health, emerging helminthic disease, and the potential to impact populations of arctic ruminants.

DISCIPLINE: Biology

FIELDWORK LOCATION: Kugluktuk, Nunavut

98-076 MCEWEN, D.J., GUO, W. and LLOYD, N. (1998). Dynamics of the polar F-region during magnetic storm. Presentation, Committee on Space Research, Nagoya, Japan, July 18, 1998.

ABSTRACT/DESCRIPTION:
F-region dynamics in the central polar cap region are being routinely monitored from an observatory at Eureka, Canada (89 CGL) using photometric and imaging devices and a

Fabry-Perot Interferometer measuring neutral winds from 01 6300 A emissions. A case study is presented of a magnetic storm on December 30, 1997 during which winds increased to 500 m/s then rapidly decreased to 100 m/s when IMF Bz switched northward and a sustained polar aurora was triggered.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Eureka, Nunavut

98-077 MCLOUGHLIN, P.D., PENNER, D., CLUFF, H.D. and MESSIER, F. (1998). Denning ecology of barren-ground grizzly bears in the central Northwest Territories. Poster presentation, 11th International Conference on Bear Research and Management, Gattinburg, Tennessee, April 20-24, 1998.

ABSTRACT/DESCRIPTION:
Between May of 1995 and October of 1997, 65 barren-ground grizzly bears (*Ursus arctos*) were equipped with satellite radio-collars within a study area of approximately 190,000 km^2, centred 400 km northeast of Yellowknife, Northwest Territories. Dates of den entry and den emergence for these bears were determined from the dates on which collar transmissions to receiving satellites ceased to be received in the fall (for den entry estimates) and the dates on which satellites resumed receiving transmissions in the spring (den emergence estimates); satellite collar transmissions are blocked entirely while animals are in dens. For years 1995, 1996, and 1997 the majority of bears denned in the last week of October; den emergence in 1996 and 1997 occurred primarily in the last week of April and the first week of May. Site investigations of dens located from satellite telemetry (aided with the use of aerial telemetry during winter) were conducted for 18 den sites. Assessment of habitat characteristics indicates use of well-drained slopes with a southerly aspect. Den investigations will continue in 1998 and 1999 with the objective of better defining the habitat needs of denning grizzly bears.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: Slave Geological Province, N.W.T.

98-078 RUSSELL, M. (1998). Use of a continuous injection dye dilution system for estimating discharge in small ice choked streams. Presentation, Prairie Division of the C.A.G., Watrous, Saskatchewan, October 17, 1998.

ABSTRACT/DESCRIPTION:
The calculation of discharge during spring breakup is difficult and prone to error for a number of reasons. Strong diurnal fluctuations in discharge, the presence of floating ice,

snow and other debris and the lack of a relationship between stage and discharge combine to make conventional current measuring techniques less than adequate, especially for water balance studies. The main drawback to current metering during spring breakup is that discharge cannot be determined on an around the clock basis, but rather can only be estimated by metering as many times as is possible during the day and attempting to catch daily maximum and minimum discharge. Because the majority of annual discharge occurs during roughly a 2 week period during spring melt, the quantification of this runoff is vital when calculating water balances. A simple method is presented which demonstrates the use of continuously injected Rhodamine dye to provide automated estimates of flow. Field trials conducted in and around Inuvik N.W.T. in two small ice choked streams during spring breakup in 1996, 1997 and 1998 indicate the system is a viable method for estimating discharge, with some problems encountered with freezing of the injected solution when the air temperature reached -10^0 C.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Trail Valley Creek, N.W.T.

98-079 NEVILLE, J. and LISSIMORE, D. (1998). Breeding Biology of Western and Semipalmated Sandpipers at Nome in 1998. Report, Department of Biological Sciences, Simon Fraser University

ABSTRACT/DESCRIPTION:
We conducted the 6th year of study of the breeding biology of Western and Semipalmated Sandpipers nesting near Safety Sound, Alaska. The birds returned late, with both species nesting synchronously, rather than the usual pattern of a week's separation. The number of nests was lower than normal, with about 70 found by the end of the season. However, hatching success was high, with over 50 broods hatching. For the first time at the site, as a pilot study, we attempted to follow the fate of broods after hatching. We succeeded in documenting the brood abandonment pattern of parents and the survivorship after hatch of ca. 8 broods. As expected from their sites, females left prior to males in most broods.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Nome, Alaska

98-080 PIPKE, K., MURRAY, J., HAY, B., SMOL, J.P. and LESACK, L.W. (1997). "A Diatom-Based Paleohydrological Model for the Mackenzie Delta, Northwest Territories, Canada". Arctic and Alpine Research, 29(4):430-444.

ABSTRACT/DESCRIPTION:
Flood plain lakes are tightly coupled to their associated river systems and their sediment records should provide integrative records of this interaction. Surface sediments and selected limnological variables were collected from 77 Mackenzie Delta lakes representing three categories of river influence: lakes having continuous connection with the Mackenzie River (n = 23; no-closure), lakes that flood every spring but lose connection during the summer (n = 26; low-closure), and lakes that flood only during an extreme spring flood stage (n = 28; high-closure). Summer lake production, using winter methane concentration as a proxy, and river influence were identified as the principal limnological gradients separating delta lakes. The diatom flora of the Mackenzie Delta lakes was dominated by benthic taxa, particularly the genera *Nitzschia* and *Navicula*, with a greater abundance of stalked, epiphytic taxa in the high-closure lakes. A robust predictive model was developed for inferring lake production from fossil diatom assemblages. The model provides a tool for estimating long-term changes in river influence and lake dynamics from the sediment record of Mackenzie Delta lakes. Diatom-inferred river influence changes within these records may then be linked with past river discharge variability.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Mackenzie Delta, N.W.T.

98-081 SANDERCOCK, B. K. (1998). "Chronology of Nesting Events in Western and Semipalmated Sandpipers Near the Arctic Circle". Journal of Field Ornithology, 69(2):235-243.

ABSTRACT/DESCRIPTION:
The chronology of nesting events was examined in Western Sandpipers (*Calidris nauri*) and Semipalmated Sandpipers (*C. pusilla*) breeding at Nome, Alaska. The duration of laying (5 d for a 4-.cgg clutch) and hatching (53.0 +, = 26.6 SD h, dry chicks to emerge from star-pipped eggs) W23 similar for both species. Laying rates of Semipalmated Sandpipers at Nome were slower than other populations, possibly because laying intervals were greater than 30 h. Length of incubation was significantly longer in Western (21.5 +, = 0.5 d) than Semipalmated Sandpipers (20.3 +, = 1.9 d). Early clutches had significantly higher hatching success than late clutches in Semipalmated Sandpipers (60.0 percent. n = 105 vs. 22.9 percent, n = 70) but not Western Sandpipers (68.2 percent, n - 88 vs. 47.3 percent. n - 55).

DISCIPLINE: Zoology

FIELDWORK LOCATION: Nome, Alaska

98-082 SANDERCOCK, B. K. (1998). "Assortative Mating and Sexual Size Dimorphism in Western and Semipalmated Sandpipers". The Auk, 115(3):786-791.

ABSTRACT/DESCRIPTION:
Sexual dimorphism in body size is widespread among animals, and most explanations for the evolution of dimorphism can be grouped into two categories: (1) sexual selection, and (2) intraspecific niche differentiation. Sexual selection clearly has been important in shorebirds (suborder *Charadrii*), because the direction and magnitude of size dimorphism are related to both mating system and the duration of parental care. Typically, the sex that competes for mating opportunities is larger, and this is true for most polygynous shorebirds (males larger) and species with sex-role reversal where females are larger. It is more difficult to explain, however, why females are the larger sex in many shorebirds that mate monogamously.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Nome, Alaska

98-083 SANDERCOCK, B.K. (1998). Factors Affecting the Breeding Demography of Western Sandpipers (*Calidris Mauri*) and Semipalmated Sandpipers (*C. Pusilla*) at Nome, Alaska. B.Sc. Thesis, Department of Biological Sciences, Simon Fraser University.

ABSTRACT/DESCRIPTION:
The breeding demography of Western Sandpipers (*Calidris mauri*) and Semipalmated Sandpipers (*C. pusilla*) was studied at Nome, Alaska for four years (1993-1996). These abundant arctic-nesting sandpipers are long-distance migrants, lay a modal clutch size of four eggs, and have biparental care. Breeding seasons were short, and both sandpipers had similar egg-laying rates, duration of incubation, and hatching rates. Clutch and egg size declined seasonally in both species: 2- and 3-egg clutches contained smaller eggs and were initiated later than 4-egg clutches. Small clutches were not retests, and were not caused by disturbance or clutch loss. This is one of the first reports of clutch size variation in birds thought to have a fixed clutch size. Of four explanations tested, seasonal variation in fecundity was most consistent with the parental-quality hypothesis. Adult females that were familiar with the study area and their mate tended to nest earlier. The cost-of-delay hypothesis was not tested because low natal philopatry precluded assessment of recruitment. Egg number was manipulated to determine whether incubation ability limits shorebird clutch size. Contrary to a widespread view, incubation capacity does not select for a maximal clutch size of four eggs in biparental sandpipers. Experimental clutch enlargement did not affect rates of abandonment, nest attendance or loss of body mass. Incubation length and hatching asynchrony were increased, but hatching success was unaffected. Other stages of reproduction warrant further investigation. Both species showed female-biased sexual size dimorphism, but there was no evidence of assortative mating for body size. Timing of laying was related to body size, but not in the expected direction. Mate choice could not explain dimorphism but intrasexual selection could be important because large females laid larger eggs. Local survival was high in sandpipers, presumably because breeding site-fidelity was strong. Females moved further than males to remate, but overall, mate-fidelity was relatively high. Low fecundity and high survival rates suggest that Western and Semipalmated Sandpipers may be vulnerable to environmental change and thus require conservation effort in the future.

DISCIPLINE: Zoology

FIELDWORK LOCATION: Nome, Alaska

98-084 SQUIRES, M., HUEBERT, D. and LESACK, L. 1998. A preliminary evaluation of factors influencing the distribution and abundance of macrophytes in the Mackenzie Delta lakes. Proceedings, American Academy of Underwater Sciences, 18th Annual Scientific Diving Symposium In Association with Canadian Association for Underwater Science, Annual Meeting, Simon Fraser University, Burnaby, B.C., October 8-11, 1998.

ABSTRACT/DESCRIPTION:
The Mackenzie Delta of the Canadian Arctic is a complex environment containing 25,000 lakes, where flooding of the lakes may exert considerable control over the ecological characteristics of the lakes in the system. For instance, lakes which are flooded regularly are turbid and lakes which are flooded infrequently are relatively clear. The availability of light may profoundly influence the pattern of primary production among the Delta takes and in particular the productivity of macrophytes. Corresponding to the light gradient there are physical and chemical gradients which may interact with light to ultimately determine the distribution and abundance of macrophytes among the lakes. Macrophyte biomass and various edaphic factors were measured along a light gradient in a subset of Delta takes. Macrophyte biomass increased sharply where average light attenuation was lower than 1.4 m 1. Increases in macrophyte biomass correspond to increases in pore-water phosphate but do not correspond to pore-water ammonia. The role of light in controlling macrophytic growth is not surprising however the possible role of sedimentary phosphorus is unusual with respect to lakes in general where nitrogen-limitation of submersed macophytes may be more common. However our data cannot discern whether pore-water phosphate is a cause or an effect of increased macrophyte biomass. It is also possible that a positive-feedback mechanism is at work where macrophytes initially enhance the availability of phosphorus associated with sediments which then leads to increased macrophyte production.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Inuvik, N.W.T.

98-085 SQUIRES, M. and LESACK, L. (1998). Relative contributions of DOC, sestonic chlorophyll, and suspended sediments to light (PAR) attenuation in lakes of the Mackenzie Delta. Presentation, American Society of Limnology and Oceanography, Annual Meeting, Santa Fe, N.M., February 1-5, 1998.

ABSTRACT/DESCRIPTION:
The Mackenzie Delta is a complex environment containing 25,000 lakes. The frequency and duration of river flooding is thought to exert considerable control over the abundance and distribution of phytoplankton, epipelon, macrophytes, and epiphytes among the lakes via the direct effect of riverine suspended sediments on light attenuation. Less clear is how DOC, from internal and external sources, and sestonic chlorophyll affect light availability and in turn autotroph assemblages. We followed light attenuation and concentrations of suspended sediments, DOC, and sestonic chlorophyll over the open water period for a subset of delta lakes exhibiting a clear gradient in flood frequency. Preliminary analysis confirms a dominant influence of suspended sediments, particularly in frequently flooded lakes, but also shows a substantial effect of DOC and chlorophyll in many of the lakes. The effect of DOC and sestonic chlorophyll may be strongest in lakes where the flood frequency and suspended sediments are at intermediate levels rather than in very clear or very turbid lakes.

Understanding the controls on the light environment among lakes of the Mackenzie Delta is necessary if we are to predict the responses of the autotroph communities to the multiple stresses of global change.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Inuvik, N.W.T.

98-086 TEARE, C. J. (1998). Spatial and Temporal Patterns of Chemical Solute Signals in Sixteen Small Tundra Streams of the Trail Valley Creek Watershed in the Western Canadian Arctic. M.Sc. Thesis, Department of Geography, Simon Fraser University.

ABSTRACT/DESCRIPTION:
The spatial and temporal patterns of major ion chemistry were examined from sixteen small tundra streams (Trail Valley Creek Watershed) of the western Canadian Arctic. Three different chemical end-members consisting of organic acid-potassium, calcium-sulfate, and calcium-bicarbonate were found to define the waters. The organic acid-potassium signal was associated with high discharge periods for most streams while the other signals were associated with low flow. There was a weak positive link between fractional content of the organic acid-potassium signal and mean basin slope but the signal had no distinct spatial pattern. The organic acid-potassium signal is most likely from the flushing of the channels between hillslope tussocks that were filled with organic material and from the flushing of organic deposits near streams. The calcium bicarbonate signal had a distinct spatial pattern that was linked to a geologic deposit of Quaternary material. The calcium-sulfate signal was found only in three streams. A link to a geologic deposit of Tertiary material was found for two of the streams but not for the third. The calcium-bicarbonate and calcium-sulfate signal became more dominant as the active layer developed and the basins' hydrologic regimes went from having a snowmelt source to a basin storage source. The main channel of Trail Valley Creek waters also showed the same three end members over the course of the study. Different subbasins had a strong temporal control on the chemistry. The organic acid-potassium signal was dominant at peak discharge but the signal shifted rapidly to the calcium-sulfate signal as discharge dropped. The calcium-sulfate signal was primarily coming from one stream with high discharge and a high sediment load. By base flow, Trail Valley Creek water was showing a calcium-bicarbonate signal. The switch in chemistry was accounted for by the decline in outflow of the calcium-sulfate stream compared to another stream with a dominant signal of calcium-bicarbonate. Most streams had ceased to flow by mid summer. The study shows that stream waters in this area are being strongly controlled by both microtopography and subsurface materials. The spatial and temporal patterns found in this data set show that spurious conclusions could be obtained from studies of limited scope.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Trail Valley Creek, N.W.T.

98-087 THORPE, N. (1998). "The Hiukitak School of Tuktu: Collecting Inuit Ecological Knowledge of Caribou and Calving Areas Through an Elder-Youth Camp". Arctic - InfoNorth, 51(4):403-408.

ABSTRACT/DESCRIPTION:
Lena Kamaoyok awoke at her usual time (4:00 a.m.) and began to prepare her teaching props. She squatted into the gentle light coming through the opening in her tent and, with her army knife, she expertly sliced through the Frosted Flakes box. She sawed with excited determination, fastidiously tracing the outline of a caribou she sketched. Within minutes she had produced a target. She would use this to teach the youth how to hunt with a bow and arrows that were already made-she'd crafted them last month, and they had been sitting in a sacred box in her *tiepiq* (tent) ever since. When the youth awoke several hours later, Lena scarcely let them finish breakfast before she wandered up the hill towards the row of talut (hunting blinds). Silently she beckoned the youth from the caribou skin tent and towards her outdoor classroom. Here they would learn how to hunt caribou just as their ancestors have done at this same place for generations.

DISCIPLINE: Sociology

FIELDWORK LOCATION: Bathurst Inlet, Nunavut

98-088 MCINTIRE, E. (1998). Plant responses to collared pika grazing in southwest YukonTerritory: the benefit of feeding. Presentation, Ontario Ecology and Ethology Colloquium, Kingston, Ontario, May 4-6, 1998.

ABSTRACT/DESCRIPTION:
In the presently glaciated St. Elias Mountains of southwestern Yukon, Canada, rudimentary plant communities occur in isolated and very unstable arctic alpine environmentalconditions. Nunataks, or barren rock islands, pierce the ice surface creating a substrate for meadow development and allowing a mammalian herbivore, the collared pika (*Ochotona collaris*), to persist. To examine the impact of the pika on these simplified and rudimentary meadows, I selected and compared sites from these icefields with sites from two other mountain ranges with similar altitude (1700-2100m), similar latitude 61-62 N, but with much less snow accumulation, different glacial histories and much more extensive plant communities. In 1996 and 1997, I erected *in situ* mesh exclosures to experimentally remove pikas and their feeding affects in order to examine plant community response, both in terms of above ground plant production and species composition changes. Generally, one and two years after exclosure placement, plant production was reduced and species richness increased within the exclosures. Associated with this shift in species composition, was the increased dominance of graminoids and other herbivore tolerant plants outside the exclosures. While pikas appear to occupy very small Nunatak sites where food would soon become limiting, their presence is causing a higher biomass of plants, and creating a positive feedback in food availability. In the process, however, they are causing a locally reduced plant species richness.

DISCIPLINE: Environmental Sciences/Ecology

FIELDWORK LOCATION: St. Elias Mountains, Yukon

98-089 PURCELL, J. D. (1998). The Biology of Poverty: An Examination of affective disorders in the James Bay communities of Ontario. Presentation, Annual Meeting of the Association of Canadian Physical Anthropologists, Calgary, Alberta, November 6, 1998.

ABSTRACT/DESCRIPTION:
Mental illness presently occupies the greatest source of morbidity amongst First Nations peoples, with rates of depression, suicide, and substance abuse far in excess of Canadian standards. While many investigators now point to a social origin in explaining this crisis -- implicating the impact of assimilation, oppression, and poverty in promoting psychological distress -- the causal link has thus far been difficult to establish. Integrating perspectives from anthropological political economy, ecology, and human adaptability, this presentation

focuses on the local experience of affective disorders in the reservation communities of Moosonee, Moose Factory, Attawapiskat, and Fort Albany, Ontario.

DISCIPLINE: Sociology

FIELDWORK LOCATION: James Bay, Northern Ontario

98-090 SPENCE, C. (1998). Fertility control and the ecological consequences of managing northern wolf. M.Sc. Thesis, Graduate Department of Botany, University of Toronto

ABSTRACT/DESCRIPTION:
I studied the social and territorial behaviour of 17 surgically sterilized wolves from 7 small wolf packs. Sterilized wolves maintained existing pair bonds, and remained in their original territories and defended them from potential immigrants. Four treated wolves formed new pair bonds and retained their dominant status upon the death of a mate. Two treated females exhibited denning behaviour in early May. I found no evidence that sterilization alters behaviour. In order to predict the long term population effects of sterilizing a wolf population, I constructed a population simulation model which includes wolves, caribou, moose, and Dall sheep. The model is parameterized using my field data and local demographic population data. It simulates lethal wolf control and wolf fertility control, as well as ungulate harvest and stochastic weather Wolf fertility control can augment rates of moose and caribou population increase and buffer prey populations from the negative effects of severe weather upon recruitment. For caribou populations, lethal control is required to initiate the recovery of a critically small herd. Sheep populations do not obviously benefit from intensive wolf management. All prey populations in the model are vulnerable to rapid decline when subjected to constant levels of harvest.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Kluane, Aishihik, Yukon

98-091 **STUART, C. (1998).** Estimating the Effective Independent Sample Size for Re-Examination of the Influence of Stake Density on Confidence in Mass Balance Estimates -- White Glacier, Axel Heiberg Island, Canada, and Abramov Glacier, Kirghizia. B.Sc. Thesis, Department of Geography, Trent University.

ABSTRACT/DESCRIPTION:
The primary purpose of this research is to determine the effective independent sample size or spatial degrees of freedom on the White and Abramov Glaciers so that the influence of stake network density may later be reexamined. For each glacier, time series of stake mass balance are correlated with each other and with the series of the whole glacier. The decrease of correlation with increasing vertical separation distance between the stake pairs is the basis for estimating the effective independent sample size for each glacier. Calculating the effective independent sample size for the entire glacier surface yields approximately 8 stakes for White Glacier and 11 stakes for Abramov Glacier. Calculating the sample size using a weighted area in which each glacier is examined by 100 m elevational bands yields a range of 3-12 stakes on White Glacier and 2-14 stakes on Abramov Glacier. However, this is a statistical endeavour to determine the effective independent sample size, and although an effective independent number of stakes is determined for the White and Abranov Glaciers, it is unknown where these stakes should be placed on the glacier.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: White Glacier, Abramov Glacier, Kirghizia, Russia

98-092 SLOCOMBE, D.S. and DANBY, R.K. (1998). Toward Collaborative Bioregional Management in the St. Elias Region. Presentation, 98th Annual Meeting of the Association of American Geographers, Boston, MA, March 27, 1998.

ABSTRACT/DESCRIPTION:
The St. Elias region is a spectacular wilderness of over 100,000 sq. km. in southwest Yukon, southeast Alaska, and northwest British Columbia. The core of the region includes several major Canadian and American parks, national forests, provincial parks, and wildlife refuges. A wide range of resource uses are found within and around the protected areas, including subsistence and sport hunting, mining, small-scale forestry, and rapidly growing tourism. Over the last decade comprehensive land claims, participatory parks planning, regional planning and other initiatives and political changes have fostered a growing interest in collaborative management of the entire bioregion. Current initiatives emphasize research, training, and visitor management, but there are the beginnings of wider cooperation, for example on biosphere reserve designation for the whole region. Efforts and prospects in the St. Elias are compared to those in other international mountain regions such as the Australian Alps.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Kluane National Park, Whitehorse, Yukon

98-093 DANBY, R. (1998). International Cooperation in the St. Elias Mountain Parks World Heritage Site. Presentation, "Crossing Borders: The 2nd Conference of the Golden Horseshoe Educational Alliance", Buffalo, NY, February 20, 1998.

ABSTRACT/DESCRIPTION:
The 98,000 sq. km. St. Elias Mountain Parks World Heritage Site is located in the border region shared by Alaska, British Columbia, and the Yukon Territory. It is comprised of four independent, yet adjacent, parks: Kluane National Park and the Tatshenshini-Alsek Wilderness Provincial Park in Canada, and Wrangell-St. Elias National Park and Glacier Bay National Park in the United States. Despite sharing intact watersheds and globally significant wildlife populations and mountain terrain, as well as the World Heritage designation, interaction between the four parks is limited. This paper provides a comparative overview of policy directives and planning and management initiatives in each of the four parks and details existing cooperation and communication between them. It is argued that the World Heritage Site, as well as its adjacent areas, would benefit from a more integrated approach to planning and management. Possible frameworks and strategies are discussed along with potential obstacles to implementation.

DISCIPLINE: Resource Management

FIELDWORK LOCATION: Kluane National Park, Yukon

98-094 BAILEY, R.C., KENNEDY, M.G., DERVISH, M.Z. and TAYLOR, R.M. (1998). "Biological assessment of freshwater ecosystems using a reference condition approach: comparing predicted and actual benthic invertebrate communities in Yukon streams". Freshwater Biology, 39:765-774.

ABSTRACT/DESCRIPTION:
The reference condition approach to bioassessment is based on comparing a biological community found at a test site to the range of communities observed at a set of reference sites. A community descriptor (e.g. number of taxa) is estimated for the test site. If the value of the descriptor falls outside of a given boundary, or biocriterion, from the distribution of the descriptors for the reference sites, the test site fails. The sensitivity of the reference condition approach can be increased by modelling and explaining variation in the community descriptor among the reference sites, and then using the predictive model to refine the expectation of the descriptor's value at a test site. This study applied the reference condition approach, with predictive modelling, to the bioassessment, using benthic macroinvertebrate (BMI) communities, of streams exposed to placer gold mining effluent in central Yukon Territory, Canada. The major changes to the stream caused by mining are increased turbidity and metal concentrations.

DISCIPLINE: Biology

FIELDWORK LOCATION: Yukon

98-095 GUILLEMETTE, S. (1998). Arctic Plant Community - soil associations mapping using spot imagery: Truelove Lowland, Devon Island, N.W.T. M.Sc. Thesis, Faculty of Graduate Studies, University of Western Ontario, January 1998.

ABSTRACT/DESCRIPTION:
A plant community - soil associations model is created to assist in the making of plant community - soil maps using SPOT satellite imagery of the Truelove Lowland, Devon Island, N.W.T. Investigation is classified according to plant communities modified from Muc and Bliss (1977) and Svoboda (1977). The Canadian System for Soil Classification (C.S.S.C., 1992) was used to classify soils to the Subgroup level. The satellite data was simplified using a supervised classification and two band combinations were used to define plant communities and associated soils. Pixel by pixel accuracy assessment was also performed on final maps. Resulting associations were found to be predictable in well-drained and poorly-drained conditions, but less predictable when classified in terms of landscape components. Two maps were produced at a scale of 1:25000. This methodology can be used to efficiently map plant communities and soils in areas where such associations exist.

DISCIPLINE: Physical Geography

FIELDWORK LOCATION: Truelove Lowland, Devon Island, N.W.T.

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